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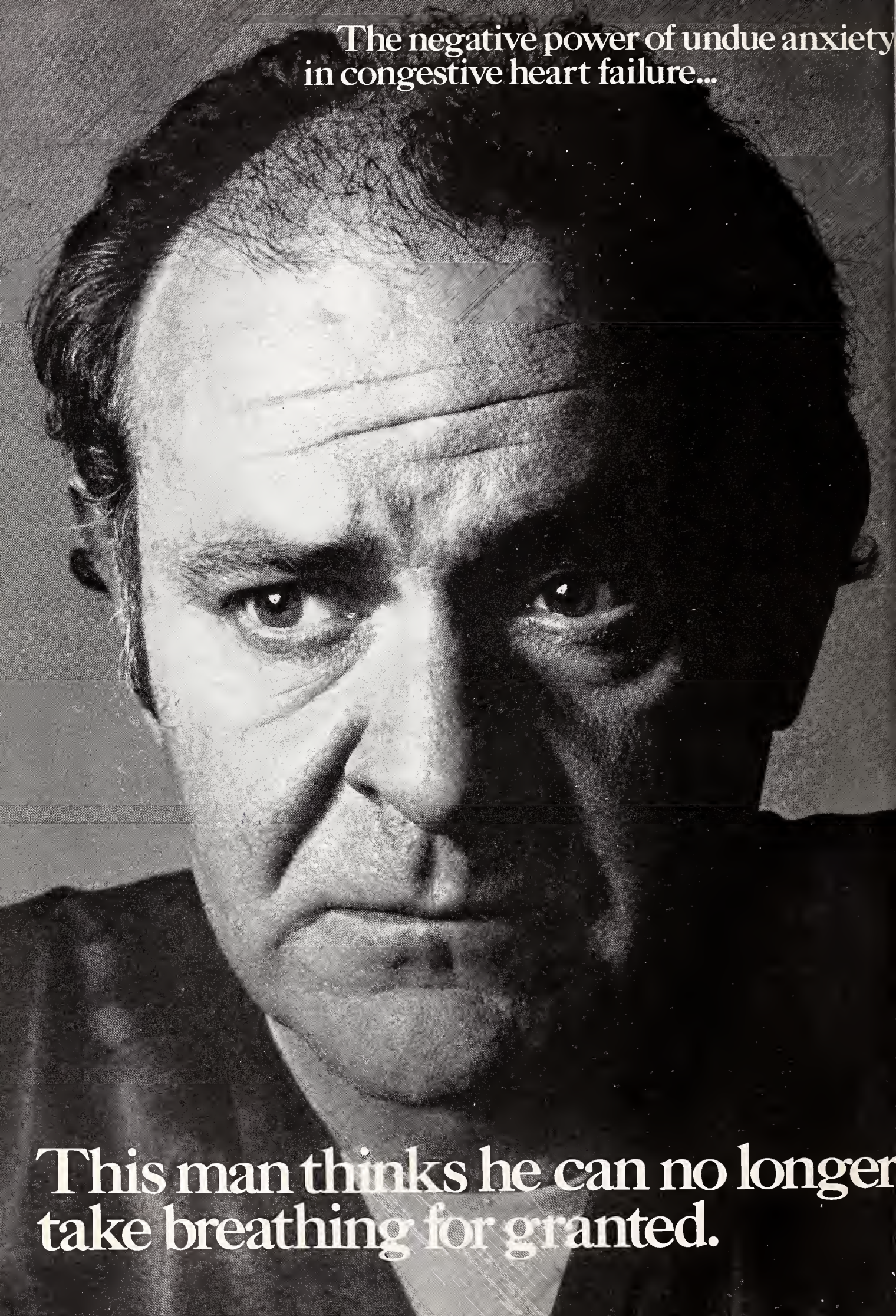
The negative power of undue anxiety
in congestive heart failure...
This man thinks he can no longer
take breathing for granted.

Typical of many patients with congestive heart failure, he also suffers from severe anxiety, a psychic factor that may influence the character and degree of his symptoms, such as dyspnea. His apprehension may also deprive him of the emotional calm so important in maintenance therapy.

Aid in rehabilitation

Specific medical and environmental measures are often enhanced by the antianxiety action of adjunctive Libritabs (chlordiazepoxide). Libritabs can also facilitate treatment of the tense convalescent patient until antianxiety therapy is no longer required. Whereas in geriatrics the *usual daily dosage* is 5 mg two to four times daily, the *initial dosage* in elderly and debilitated patients should be limited to 10 mg or less per day, adjusting as needed and tolerated.

Concomitant use with primary agents

Libritabs is used concomitantly with certain specific medications of other classes of drugs, such as cardiac glycosides, diuretics, antihypertensives, vasodilators and oral anticoagulants, whenever excessive anxiety or emotional tension adversely affects the clinical condition or response to therapy. Although clinical studies have not established a cause and effect relationship, physicians should be aware that variable effects on blood coagulation have been reported very rarely in patients receiving oral anticoagulants and chlordiazepoxide HCl.

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Indicated when anxiety, tension and apprehension are significant components of the clinical profile.

Contraindications: Patients with known hypersensitivity to the drug.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. As with all CNS-acting drugs, caution patients against hazardous occupations requiring complete mental alertness (*e.g.*, operating machinery, driving). Though physical and psychological dependence have rarely been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage; withdrawal symptoms (including convulsions), following discontinuation of the drug and similar to those seen with barbiturates, have been reported. Use of any drug in pregnancy, lactation, or in women of childbearing age requires that its potential benefits be weighed against its possible hazards.

Precautions: In the elderly and debilitated, and in children over six, limit to smallest effective dosage (initially 10 mg or less per day) to preclude ataxia or oversedation, increasing gradually as needed and tolerated. Not recommended in children under six. Though generally not recommended, if combination therapy with other psychotropics seems indicated, carefully consider individual pharmacologic effects, particularly in use of potentiating drugs such as MAO inhibitors and phenothiazines. Observe usual precautions in presence of impaired renal or hepatic function. Paradoxical reactions (*e.g.*, excitement, stimulation and acute rage) have been reported in psychiatric patients and hyperactive aggressive children. Employ usual precautions in treatment of anxiety states with evidence of impending depression; suicidal tendencies may be present and protective measures necessary. Variable effects on blood coagulation have been reported very rarely in patients receiving the drug and oral anticoagulants; causal relationship has not been established clinically.

Adverse Reactions: Drowsiness, ataxia and confusion may occur, especially in the elderly and debilitated. These are reversible in most instances by proper dosage adjustment, but are also occasionally observed at the lower dosage ranges. In a few instances syncope has been reported. Also encountered are isolated instances of skin eruptions, edema, minor menstrual irregularities, nausea and constipation, extrapyramidal symptoms, increased and decreased libido—all infrequent and generally controlled with dosage reduction; changes in EEG patterns (low-voltage fast activity) may appear during and after treatment; blood dyscrasias (including agranulocytosis), jaundice and hepatic dysfunction have been reported occasionally, making periodic blood counts and liver function tests advisable during protracted therapy.

Supplied: Tablets containing 5 mg, 10 mg or 25 mg chlordiazepoxide.

The positive power of

Libritabs®

(chlordiazepoxide)

5-mg, 10-mg, 25-mg tablets

t.i.d./q.i.d.

up to 100 mg daily

for severe anxiety accompanying congestive heart failure

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Volume LXXIII, Number 7—July, 1972

The JOURNAL of the KANSAS MEDICAL SOCIETY

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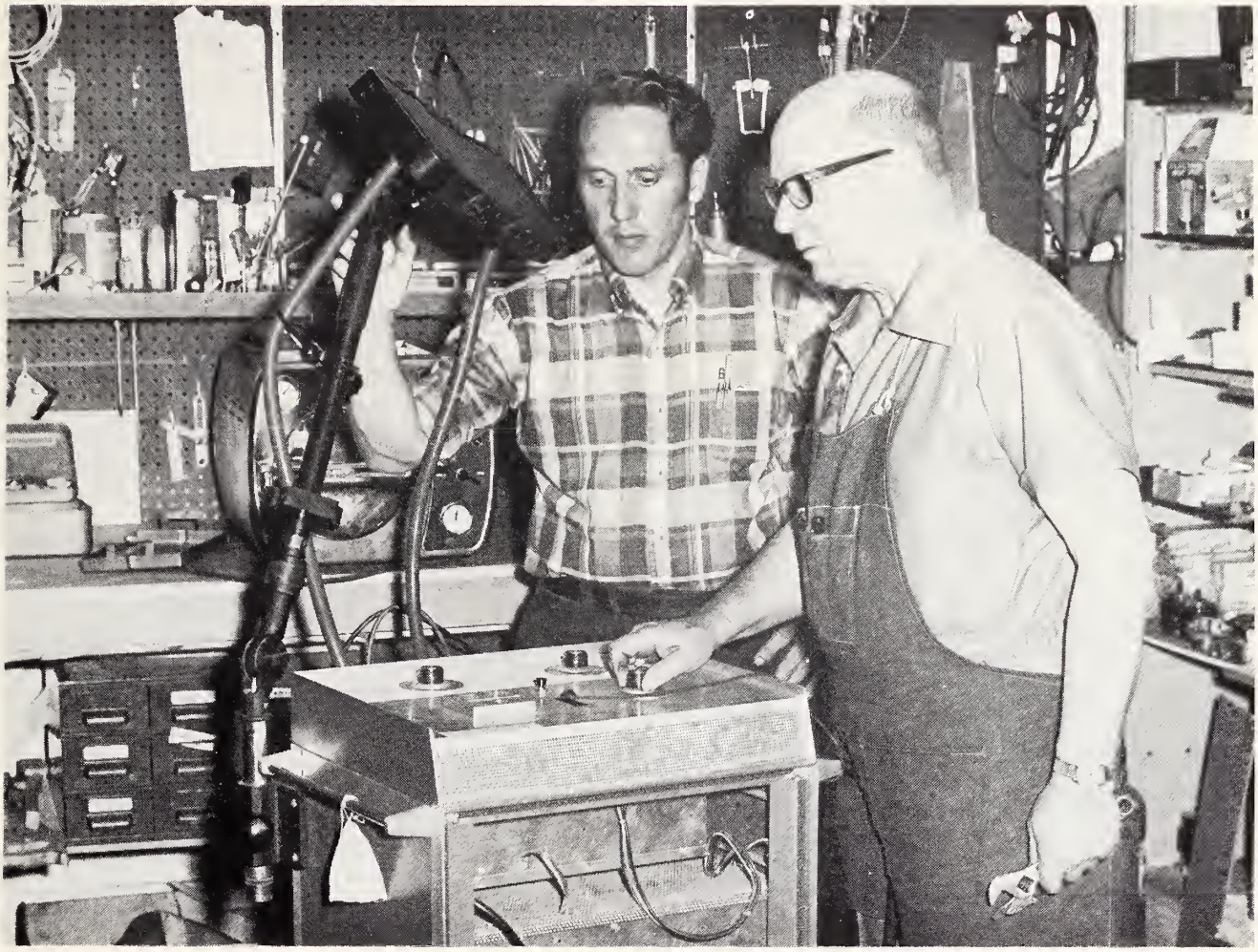

L. T. Spurgeon (right)—Robert Donaldson (left).

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Book REVIEWS

CARE OF THE GERIATRIC PATIENT by E. V. Cowdry and Franz U. Steinberg. Fourth Edition. The C. V. Mosby Company, St. Louis. 1971. 424 pages. $21.00.

The book is well written and logically organized into four parts:

Part I:	Medical Care
Part II:	Surgical Care
Part III:	Nervous and Mental Care
Part IV:	Delivery of Care

Fifty-four contributors are represented.

The senior editor proclaims himself to be a geriatric patient. He was an eminent scientist and medical educator for many years. Interestingly, many of the contributors are emeritus medical and surgical specialists whose names are familiar to most American physicians. Among them are J. Arnold Bargen, Warren H. Cole, Paul Starr, and Paul Dudley White. How could a more informed and existentially involved panel of experts be assembled?

The plan put forth in this book is that the internist is to direct the medical care of the geriatric patient. He should employ the expertise of his own specialty and appropriately refer his patient to specialists in other fields when their special knowledge and skills are needed. The internist, as captain of the team, is the usual model of medical logistics organization in this country, and remains the most logical schema for such organization. The skilled physician must know of and be able to utilize all the varied resources in behalf of his geriatric patient that our increasingly complex society provides. This well organized book gives him such help.

No new ground is broken and no new ideas are brought out. The further development and expansion of home-care programs is stressed. This is logical, if for no reason other than because of mounting medical costs. Controversial issues such as terminal care, euthanasia, death and dying are, probably wisely, entirely avoided. No reference is made to the basic economic, social, and medical problem of our time, that of overpopulation.

The reader can expect to find a well organized manual for geriatric medical care. However, he should not expect to find anything significantly new and certainly no new breakthroughs. Even at the high price of $21.00, this book can be recommended to physicians and other health care professionals, as the introduction states, "not on past developments nor on help which may become available, but on what is and can be supplied to physicians today."—*D.V.P.*

LASERS IN MEDICINE by Leo Goldman, M.D. and R. James Rockwell, Jr. Gordon and Breach Science Publishers, Inc., New York, London, and Paris. 1971. 385 pages.

Lasers in Medicine is an unusually readable book which explains rather succinctly the history, physics, medical and non-medical applications, and future promises of lasers in medicine. The chapters dealing with the physics of laser emissions and laser devices are well written and well illustrated in an understandable fashion. There are, however, several areas where a generous background knowledge of mathematics and physics would be of benefit to the reader. Chapters dealing with laser biology, investigative studies in animals, and laser reactions in living tissue lay a concrete foundation for the understanding of the use of the laser beam in medical treatment, research, and the potential hazards and risks of this mode of treatment. A laser monitoring safety program is well outlined in the text, and the need for well planned safety programs including legislation and education are outlined. Clinical investigative studies of the laser in ophthalmology, dermatology, and cancer research are briefly described. The book in general presents a research oriented description of the laser and its application to medicine of today and in the future.—R.M.

, peeper (tree frog, *Hyla crucifer*):
nall amphibian can expand
oat membrane with air until it is
the size of its head.

Month in Washington

More than 80 members of the House and Senate introduced legislation that would establish a separate Department of Health, a proposal advocated by the American Medical Association for a century. Twenty-four Democratic senators and 60 representatives, 54 Democrats and 6 Republicans, had signed the bill when it was introduced. Additional sponsors were expected to be added later.

The legislation, which would break up HEW into three departments, ran counter to President Nixon's plan for government reorganization. His plan calls for merger of HEW into a new, even bigger Department of Human Resources. Introduction of the separate health department legislation coincided with Nixon's sending of a second special message to Congress urging action on his reorganization proposal.

Some sponsors of the health department bill indicated they might compromise on two departments—one for health and welfare, and one for education.

The AMA House of Delegates in 1873 adopted a resolution calling for a separate federal department "as a *means* of promoting sanitary science and the protection of the public health." In 1891, the delegates approved appointment of a committee "to memorialize Congress at its next session on the subject of creating a cabinet officer to be known as the medical secretary of public health."

Through the years, the House of Delegates has reaffirmed this position, the most recent such action having been in December, 1970, when this resolution was adopted:

"*Resolved,* That the American Medical Association, in the public interest, continue its efforts to bring about the creation of a separate federal Department of Health, whose chief officer would be a physician of cabinet rank."

If the new proposal is enacted, it would transfer all health responsibilities of HEW—including administration of Medicare and Medicaid—to the new department immediately. The President would be authorized to transfer health-care functions of other agencies to the department within 180 days of enactment.

The Ribicoff Bill also would set up a 19-member National Advisory Commission on Health Planning to aid in establishment of the department and to undertake a two-year study leading to recommendations for a 10-year national health policy.

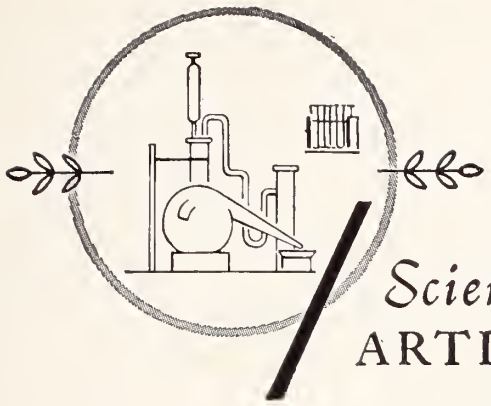
The American Medical Association supports legislation that would amend the Medicare law to expand the circumstances under which payment could be made for services rendered by physicians' assistants.

Payment now is permitted only when the assistant performs the services in the physician's presence. Under an amendment offered in the Senate to H.R. 1, such payment would be allowed where the assistant performs the services without the physician being present. However, an assistant would not be allowed to practice medicine autonomously or without supervision of his physician employer.

H.R. 1 provides for revisions of Social Security, including Medicare and Medicaid.

In a letter to Sen. Gaylord Nelson (D.-Wis.), sponsor of the physician's assistant amendment, Dr. Ernest B. Howard, AMA executive vice president, said:

"We believe the amendment to be salutary. As you know, the AMA is fostering the development of appropriate programs to increase the number of physicians' assistants. It is anticipated that such assistants will serve in various ways, and their role can be a valuable one in helping to meet our health manpower needs. In rural settings, for instance, the assistants may serve in communities or areas removed from the physician's office. The Medex program is one example of the assistant serving to extend the physician's services into adjoining areas.



Scientific
ARTICLES

Diabetes Mellitus

An Important Factor of Risk in Premature Myocardial Infarction

HARRY L. DOUGLAS, M.D., ***Hollister, Missouri***

A study of 80 consecutive admissions to the Veterans Administration Hospital at Kansas City, Missouri, of men below the age of 50 with either acute or old myocardial infarctions, showed a high prevalence of decreased glucose tolerance. Findings strongly suggest that diabetes—not only overt, but subclinical—is an important factor of risk in premature myocardial infarction.

THE CONCEPT that diabetes mellitus is a hereditary, extremely complex disease only one facet of which is a decrease in glucose tolerance, has been emphasized for many years by numerous authors. It is generally accepted that diabetics develop various degenerative changes at a much earlier age than non-diabetics—and in particular, arteriosclerosis involving the coronary, peripheral, and cerebral vessels. There is frequently no correlation between the severity of vascular disease and the defect in carbohydrate metabolism associated with latent or overt diabetes. The appearance of arteriosclerosis often precedes the diagnosis of diabetes and, as suggested by Conn and Fajans, may represent an advanced stage of the diabetic syndrome.[1]

One cannot help being impressed by the number of young men with myocardial infarctions, either old or acute, who show evidence of decreased glucose tolerance, as measured by the standard glucose tolerance test (GTT) or the cortisone glucose tolerance test (CGTT). One might suspect that in many of these patients latent or subclinical diabetes may have been present for long periods of time, and that an appropriately designed study of such a group would reveal a high prevalence of the disease.

The diagnosis of diabetes in patients with acute myocardial infarction is liable to be missed, even after prolonged hospitalization. At the time of admission, many such patients have anorexia as the result of pain or having received opiates, and are immediately given low-calorie diets, which result in normal fasting or postprandial blood sugar levels. Subsequent blood glucose determinations may never be requested or GTT carried out. In the case of patients with evidence of old myocardial infarction, many of whom are obese or are admitted because of chest pain, low-calorie diets are usually ordered, and the presence of diabetes effectively obscured.

The fasting blood sugar which, unfortunately, is still the routine test used in many hospitals, is one of the least effective measures for the detection of diabetes. It is probable that 75 per cent or more of all mild diabetics have normal fasting blood sugars, which merely reflect the result of a 12- to 14-hour fasting period. Examination of an early morning urine specimen for glucose is of even less value as a screening test.

The purpose of this study was to determine the prevalence of decreased glucose tolerance in men below the age of 50 who had suffered myocardial infarctions, and further explore the possible role of diabetes mellitus as a factor of risk in premature coronary heart disease.

Material

This report concerns 80 consecutive admissions to the Veterans Administration Hospital, Kansas City, Missouri, of men below the age of 50 years, who showed unequivocal EKG evidence of acute myocardial infarction (current of injury, Q-waves and symmetrical T-wave inversion), or QRS changes clearly indicative of old myocardial infarction. The average age of the group was 43.3 years. Two subjects were excluded from the study because of cirrhosis of the liver, and one because of a previous diagnosis of acute pancreatitis. Three patients whose EKG was normal had conclusive evidence of myocardial infarction in records obtained at the time of previous admissions to this hospital.

Among 70 patients who gave no history of diabetes and were given GTT, 24 had acute infarctions, with the onset of the attack at most a few days before admission; 42 had suffered infarctions at periods ranging from approximately 1 to 12 years previous to this admission; and in 4 subjects the age of the infarction was indeterminate.

Twenty non-obese patients in the same age group, who gave no history of coronary heart disease (CHD) or family history of diabetes, and showed no stigmata of diabetes, constituted a control series. GTT was carried out on these subjects.

Methods

Routine laboratory tests in this hospital included a fasting blood glucose on the day following admission, a blood cholesterol determination, and a blood sugar two hours after the noon meal, which contained no specified carbohydrate load (and may not have been eaten). Later, a standard GTT was carried out with administration of 100 gm of glucose. In subjects with acute infarctions, the GTT was performed at least two weeks after admission and when all patients were up and about the ward; all of the patients with old infarctions were fully ambulatory at the time of the test and were not acutely ill. Most patients were receiving either an unrestricted diet or a low-fat diet (which included more than 200 gm of carbohydrate daily) and none less than 150 gm of carbohydrate daily. It has been reported that a diet containing 150 gm of carbohydrate daily for four days will restore decreased glucose tolerance resulting from an extremely low carbohydrate intake.[2]

If the standard GTT was normal, a CGTT was performed in the manner originally described by Fajans and Conn.[3] Fifty mg of cortisone acetate was given 8½, and again 2 hours before the administration of glucose. If the patient weighed more than 160 pounds, the dose of cortisone was 62.5 mg at each time interval.

Glucose determinations were performed on the AutoAnalyzer, employing the Hoffman modification of the ferricyanide method,[4] but using plasma instead of whole blood. O'Sullivan and Kantor have reported upon factors which influence precision in the use of the AutoAnalyzer.[5] When whole blood is used, both an increase in the hematocrit and sedimentation of the blood on the sample plate may decrease the glucose values obtained. They found plasma levels to be approximately 14 per cent higher than corresponding whole blood levels. When 200 blood samples were run in duplicate in our laboratory, we found plasma glucose values to average about 16 per cent higher than those for whole blood, with an increase in this difference at high blood glucose levels.

Tustison, Bowen and Crampton have established criteria for the diagnosis of diabetes using the Technicon AutoAnalyzer and plasma, rather than whole blood.[6] They found the normal upper limits for the oral GTT using plasma to be 185 mg/100 ml at 1 hour, and 140 mg at 2 hours—equivalent to 160 mg and 120 mg respectively when whole blood is used.

Many authorities agree that the 2-hour blood sugar level is the most significant in the diagnosis of diabetes, although the 1-, 1½-, and 3-hour levels are obviously of value, as well as the development of glycosuria. Taking into consideration the many factors which make it difficult to establish arbitrary blood glucose levels indicative of diabetes, for the purpose of this study, 140 mg/100 ml will be used as the normal upper limit at two hours for the oral GTT using plasma.

Results

Among the 80 subjects studied, eight had previously been diagnosed as having diabetes. The diagnosis was confirmed by grossly elevated fasting and postprandial blood glucose levels, with glycosuria present in all cases. In addition, there were two patients whose blood (plasma) glucose levels upon admission were 317 mg and 450 mg per 100 ml, and a follow-up study showed them to be obviously diabetics. In the case of these ten patients GTT was unnecessary for diagnosis.

Of the 72 patients who were not known to have diabetes (including the two who did not have GTT), 45 (56.25 per cent) had 2-hour blood glucose levels exceeding 140 mg/100 ml. Results of the GTT carried out on 70 subjects in this group, along with the control series, are shown in *Figure 1* and *Table 1*. The mean 2-hour glucose level for these 70 "non-diabetics" was 150 mg., compared to 104 mg in the control group—a difference which is statistically highly significant ($P<0.0001$).

Results of GTT in 24 patients with acute infarctions compared with those in 42 patients with old infarctions are shown in *Figure 2*.

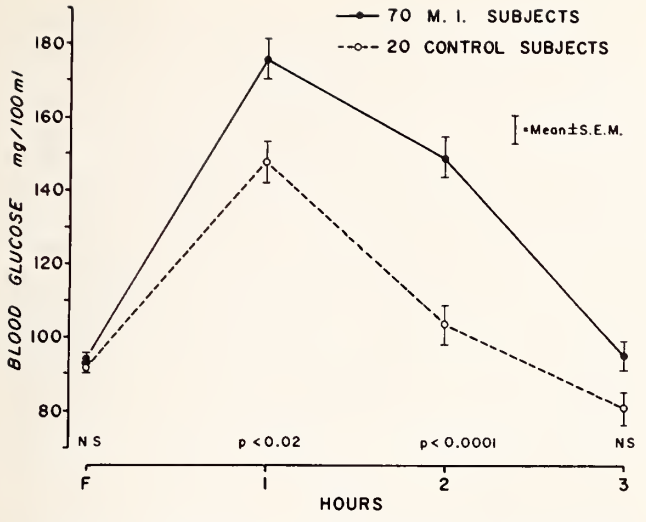


Figure 1. Results of GTT carried out on 70 subjects, along with control series.

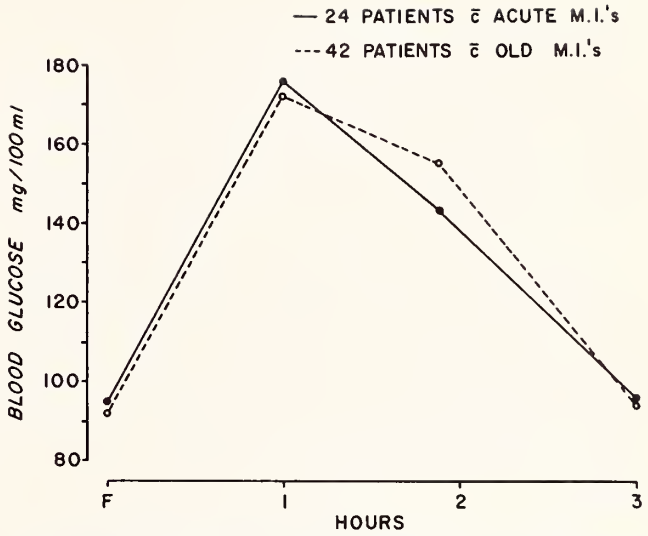


Figure 2. Results of GTT in 24 patients with acute infarctions, compared with old infarctions in 42 patients.

Twenty-seven patients who had entirely normal GTT were given CGTT. Of these, 13 (16.25%) had 2-hour blood glucose levels following administration of cortisone, which exceeded 165 mg/100 ml and may be considered abnormal. Conn and Fajans have established a 2-hour blood glucose level of 140 mg (whole blood) as a positive or abnormal response in subjects between the ages of 20 and 39 years.

Certain factors seemed to be associated with elevated 2-hour blood glucose levels:

Family history of diabetes. Sixteen patients among the 72 who were not known to have diabetes gave a family history of the disease. Fifteen of these had a 2-hour blood sugar above 140 mg, and the mean 2-hour level for this group was 180 mg/100 ml.

Family history of coronary heart disease. Of 30 patients who gave a family history (parents or siblings) of myocardial infarction or death from a "heart attack," 22 showed a 2-hour blood glucose above 140 mg, with an average value of 162 mg/100 ml.

Presence of peripheral or cerebral arteriosclerosis. Of 13 patients in this category, ten had blood sugar levels above 140 mg, with a mean of 160 mg/100 ml.

Obesity. A patient was considered to be obese if his weight was 10 per cent or more above his de-

TABLE I

RESULTS OF GLUCOSE TOLERANCE TESTS. MEAN GLUCOSE LEVELS WITH STANDARD DEVIATION IN 70 MEN WITH PREMATURE MYOCARDIAL INFARCTION AND 20 CONTROLS

	Means and Standard Errors (in mg per 100 ml)	*U-Statistics (Mann-Whitney)*	*Significance Levels*
Fasting			
Controls	91.7 ± 1.5	0.899	N.S.
Men with myocardial infarctions	94.1 ± 1.5		
One Hour			
Controls	148.0 ± 5.8	2.500	P<0.02
Men with myocardial infarctions	176.3 ± 5.5		
Two Hours			
Controls	103.8 ± 5.4	3.858	P<0.0001
Men with myocardial infarctions	150.0 ± 5.7		
Three Hours			
Controls	80.7 ± 4.6	1.694	N.S.
Men with myocardial infarctions	95.1 ± 4.0		

sirable weight as listed in the Metropolitan Life Insurance chart, and if in the opinion of the author he was obviously overweight. Thirty-six of the 72 subjects were obese (15 weighing 200 pounds or more), of whom 28 (77%) had 2-hour blood levels exceeding 140 mg, and the mean for this group was 182 mg/100 ml.

Elevated blood cholesterol. The normal upper limit for total blood cholesterol is not strictly defined in many laboratories. Twenty-nine of the 72 subjects had blood cholesterol levels above 250 mg/100 ml. Of these, 25 (86%) had 2-hour blood sugars above 140 mg, and the mean level for the 29 was 180 mg/100 ml.

Discussion

Many factors of risk have been suggested regarding the etiology of CHD. These include heredity, diet, occupation, income, smoking habits, lack of physical exercise, vital capacity, hypertension, physical build, obesity, mental stress, personality traits, smog, hypothyroidism, elevated blood cholesterol or triglycerides, and various EKG abnormalities (evidence of left ventricular hypertrophy, left axis deviation, T-wave changes, etc.). Relatively few studies have been carried out to determine the prevalence of diabetes among persons who have suffered myocardial infarctions, and few of these studies have been confined to younger age groups.

Goldberger, Alesio and Woll found decreased glucose tolerance in 10 of 14 patients with myocardial infarction.[9] Schrade, Boeble and Biegler performed GTT on 74 patients who had suffered myocardial infarctions, and found that 73 per cent of them showed evidence of diabetes.[10] Waddell and Field, using Conn's criteria for interpretation of the GTT, studied 47 patients with severe arteriosclerotic disease, such as coronary thrombosis or occlusive peripheral vascular disease, and reported 78 per cent to have definite diabetes and 7 per cent probable diabetes.[11] All of their patients had normal fasting blood sugar levels.

Reaven *et al.* performed GTT on 41 patients who were not known to have diabetes and had survived one or more myocardial infarctions.[12] Seventeen of the 41 patients had diabetic GTT. Among the remaining patients 14 had an abnormal CGTT. Twenty-three of the patients with infarctions were above the age of 50; nine of the 17 with abnormal GTT were above the age of 60, and one was 81 years old.

Fabrykant and Gelfand demonstrated abnormal glucose tolerance in 27 of 42 patients with angina pectoris.[13] None of these had clinical evidence of diabetes; none showed glycosuria when 24-hour urine specimens were tested; only four had elevated fasting blood sugars. Seven of the 27 subjects with abnormal GTT subsequently suffered myocardial infarctions, and seven developed frank diabetes—in five patients after infarction had occurred.

Epstein *et al.*, in a study of the Tecumseh, Michigan, community concluded that abnormal elevation of the blood glucose level after a standard glucose load should be considered as a factor of risk associated with CHD.[14] They found that 25 (36.8%) of 68 men and 16 (40%) of 40 women with myocardial infarction or angina pectoris had abnormal elevation of blood sugars one hour after receiving 100 gm of glucose. Two-hour blood sugars might have been more significant.

Wahlberg studied 190 patients with acute myocardial infarction who had no history or signs of clinical diabetes. He found 29 per cent to have a diabetic intravenous glucose tolerance (IVGT), 31 per cent borderline, and 40 per cent normal.[15] Upon re-testing 129 patients after hospitalization, there was no evidence that the acute infarctions had been responsible for abnormal GTT. In another group of 160 patients (mean age 57 years) with a previous myocardial infarction and no evidence of diabetes, 30 per cent showed a diabetic IVGT, 23 per cent were borderline, and 47 per cent normal. He summarized results of 12 studies dealing with oral GTT in patients with ischemic cardiovascular disease, comprising a total of 590 subjects—61 per cent of whom had abnormal or borderline tests.

Tzagournis, Seidensticker and Hamwi studied 25 patients with premature CHD, with ages ranging from 30 to 49 years, and an average of 39 years.[16] Known diabetics and obese patients were excluded from the study. Included in the report were data on serum lipids, glucose tolerance, and the serum insulin response to a glucose load. The most common abnormality observed was in the serum insulin response to administration of glucose. In 19 subjects, insulin secretion was delayed or insulin levels were elevated, responses of a kind frequently found in early diabetics. An elevation of serum lipids was found in 16, and an abnormal GTT in 10 of the 25 subjects. Of the 22 patients who showed abnormalities, 20 had either insulin or glucose abnormalities, suggesting the possibility of diabetes.

An early report from the Framingham Study, describing a six-year follow-up experience, suggested that important factors associated with susceptibility to CHD are elevated serum cholesterol, hypertension, and EKG evidence of left ventricular hypertrophy.[17] In a subsequent report, factors associated with excess risk were identified as serum cholesterol level, hypertension, cigarette consumption, vital capacity, relative weight, and certain EKG abnormalities.[18] For at least the first 15 years of this study, which was initiated in 1949, only random blood glucose determinations were carried out on each biennial ex-

amination. The mean blood glucose level of 82 mg per 100 ml, which was obtained using the Somogyi-Nelson method, would suggest that blood specimens were drawn in the fasting state.

Few clinicians would concede that a "casual" blood sugar determination carried out every two years constitutes "close medical surveillance" as far as detection of diabetes is concerned. This method of screening may explain the fact that a more recent report from the Framingham Study, dealing with unrecognized myocardial infarctions over a 14-year period, showed that of 188 persons who suffered infarction only 19 had been diagnosed as having diabetes.[19]

It was noted early in the Framingham Study that subjects who were found to have glycosuria, or even modest elevation of these random blood glucose determinations, ran a three- to five-fold excess risk of developing CHD, brain infarction, or intermittent claudication.[20] However, only in recent years has diabetes been added to the "coronary profile," and its possible significance as a risk factor has been assigned little weight—compared, for instance, with the number of cigarettes smoked daily.

In a report from Stockholm, Paasikivi described a five-year study of 178 patients who had no history or signs of overt diabetes, and had recovered from a myocardial infarction.[21] Of the 178, 29 per cent had a diabetic, 28 per cent a borderline, and 43 per cent a normal intravenous glucose tolerance. Of the subjects with abnormal results, nearly one half were obese and 24 per cent had hypertension.

Bahl has reported results of GTT and prednisone-primed GTT in 45 patients who had suffered myocardial infarction before the age of 45, and gave no history of diabetes.[22] Frank diabetic curves were obtained in 11, probable diabetic curves in two, and abnormal responses to prednisone in 21—a total of abnormal results in 75.5 per cent compared with 8.8 per cent in a control group.

Although one must concede that at the present time the standard GTT is the most reliable measure for the detection of diabetes, there is no unanimity in regard to criteria for diagnosis, even when identical methods for blood glucose determination are used. In addition to the lack of precision in carrying out the test in many laboratories, and difficulty in interpreting glucose tolerance curves, various other factors may affect the results: age of the patient, previous carbohydrate intake, weight loss, bed rest, medications, etc.

The fasting blood sugar is too often normal except in overt diabetics; the one-hour blood glucose in one study caught the peak or maximal blood glucose level in only 17 per cent of individuals;[23] and many early diabetics at the end of three hours show a precipitous drop in blood glucose to hypoglycemic levels.[24] It follows that any method for interpretation of the GTT which is based upon the sum of the fasting, one-, two-, and three-hour glucose levels must be subject to error, in that either one or both of the fasting or three-hour levels would usually need to be abnormally elevated to confirm the diagnosis of diabetes.

Fajans and Conn, using the Somogyi-Nelson method, have defined a diabetic GTT as exhibiting a one-hour value of 160 mg or more, a 1½-hour value of 140 mg or more, and a two-hour value of 120 mg or more per 100 ml.[3] This interpretation, assigning no weight to fasting or three-hour levels, has been widely accepted by clinicians. Comparable values, using the AutoAnalyzer and plasma, would be 185 mg, 160 mg and 140 mg.

The CGTT is probably not widely used clinically, though many authorities feel that it is of value in the detection of subclinical diabetes. According to Conn and Fajans, an individual who has a normal GTT but an abnormal CGTT is seven times more likely to have a subsequent diagnosis of diabetes than an individual with a normal CGTT.[8] Of our 27 patients who had normal GTT, 13 (48%) had abnormal CGTT, and would appear to be likely candidates for the development of clinical diabetes.

A fairly popular belief among clinicians is that initial hyperglycemia and abnormal GTT, if carried out a few weeks or even months following an acute myocardial infarction, are transient phenomena and often not related to diabetes. Among others, Datey and Nanda have reported upon hyperglycemia after acute infarction and its relation to diabetes.[25] They observed initial hyperglycemia in 65 per cent of 147 patients with acute infarction persisting for seven to ten days, and decreasing to 29 per cent at the end of one month. Although in their study patients with a family history of diabetes were excluded, and only a few of their patients were obese, a follow-up of 57 subjects one or two years after the attack showed that 14 per cent had developed clinical diabetes, and 17.5 per cent still had abnormal GTT; thus, nearly one third of these patients were presumably diabetic. One can only speculate upon the results of longer follow-up studies.

An acute myocardial infarction or other vascular accident, such as stroke, may affect the GTT but does not render it invalid, and follow-up studies for detection of diabetes are strongly indicated. If the decrease in glucose tolerance is the result of acute infarction, one might anticipate that GTT in the group with acute infarctions would show a greater degree of abnormality than in the subjects with old infarctions. Examination of *Figure 2* will show that such was not the case in our subjects.

It is not the intent of the author to imply that diabetes is the only etiologic factor in CHD

(though I have long held the suspicion that it may be the most important). Heredity, hypertension, obesity, elevation of blood cholesterol and triglycerides, etc., are undoubtedly important; but some of these may be interrelated with diabetes, and should alert the clinician to the possibility of the disease. Even hypertension, the importance of which few would question, has been reported to occur more frequently in diabetics who suffer myocardial infarction.[21, 26]

Differences of opinion have long existed as to the degree to which control of hyperglycemia affects the development of CHD or other "complications" in persons with diabetes, and the management of young adults with subclinical diabetes who have suffered a myocardial infarction presents a complex problem. The progression of decreased glucose tolerance may be delayed or prevented, in latent or even overt diabetes by weight reduction when obesity is present, or by daily doses of a sulfonylurea drug. Fajans and Conn gave 0.5 gm of tolbutamide two or three times daily to 20 asymptomatic, non-obese diabetics for periods up to 84 months.[8] Ages of the patients ranged from 11 to 35 years. In seven patients, the GTT became normal within four months; in three patients, within 10 to 14 months; some improvement in the GTT was noted in seven patients. The authors emphasize the importance of early diagnosis and long-term therapy.

Paasikivi summarizes studies made of long-term tolbutamide treatment of subjects without overt diabetes, three of which showed improvement in glucose tolerance and two showed none.[21] Results of such studies must be affected by factors such as the age group selected, the time interval after discontinuance of the drug, presence of obesity, weight loss, and carbohydrate restriction in the diet. It is generally agreed that deterioration in the glucose tolerance occurs in most cases when treatment is discontinued.

The effect of long-term tolbutamide therapy upon the survival rate from CHD in patients with either mild or overt diabetes is a controversial subject.[21, 27, 28] It would seem difficult to evaluate the effect of any drug upon the survival rate of diabetics in their 60s, 70s, or 80s, who may be presumed to have coronary artery disease, whether or not it can be recognized clinically.

Results of the University Group Diabetes Program study, indicating a higher mortality rate among diabetics treated with tolbutamide than in control groups, has received widespread criticism.[28] In this study, it was assumed that the newly discovered diabetics used as subjects were all in the early stages of their disease, "new diabetics." It has been estimated that for persons in their 40s and 50s, the average length of time between the appearance of impaired glucose tolerance and the diagnosis of diabetes is at least 10 to 12 years.[30] It was also assumed that such subjects in their 50s and 60s could be accurately classified as to the degree of CHD present by such risk factors as hypertension, digitalis therapy, anginal syndrome, or even EKG findings, which are not infallible. It would seem difficult to select more than 800 elderly diabetics (one 79) who have "a minimal life expectancy of five years," considering the fact that "a large percentage of the patients had one or more of the vascular complications frequently associated with diabetes."

Tolbutamide will not reverse, and may not delay progression of the arteriosclerotic process after it has once been established in a diabetic. Whether or not early diagnosis of the diabetic syndrome and long-term treatment with a sulfonylurea or other drug will prevent CHD is a subject for speculation, and the answer will require many years of study which must include long-term therapy of young diabetics.

It has been estimated that 25 per cent to 30 per cent of adults in this country are prediabetics,[29] an estimate which may seem reasonable if one reflects upon the hereditary features of the disease. The problem posed by this hereditary factor would at present appear to be insoluble.

With increasing frequency, the term "hyperglycemic" (mildly, moderately, severely) is being substituted in medical literature for the diagnosis of diabetes. Although well aware of the fact that elevation of the blood glucose above accepted normal levels in any one individual does not invariably indicate diabetes, the author—perhaps rather naïvely—is of the opinion that in a young man, with coronary or other arteriosclerotic disease, the most *likely* cause of such a finding is diabetes mellitus.

Summary

A study of 80 consecutive admissions to the Veterans Administration Hospital at Kansas City, Missouri, of men below the age of 50 with either acute or old myocardial infarctions, showed a high prevalence of decreased glucose tolerance. Findings strongly suggest that diabetes—not only overt, but subclinical—is an important factor of risk in premature myocardial infarction:

Eight (10%) were known diabetics.

Forty-five (56.25%) showed abnormal elevation of the 2-hour blood glucose levels after receiving 100 gm of glucose.

Thirteen (16.25%) had normal GTT but abnormal CGTT.

Fourteen (17.5%) showed no evidence whatever of decreased glucose tolerance.

Acknowledgments

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Thoracotomy for Pneumothorax

Bilateral Approach to Spontaneous Pneumothorax

IVAN K. CROSBY, M.D., B.S., F.A.C.S., EUGENIO E. FIALLOS, M.D.
and WILLIAM A. REED, M.D., F.A.C.S.,* *Kansas City, Missouri*

The methods of treatment of spontaneous pneumothorax have become reasonably standard in recent years. Most authors would suggest that the first two episodes of pneumothorax on the same side should be treated by conservative means, including tube drainage. The third episode on the same side should be treated by thoracotomy and pleurectomy, or abrasion. One may elect operation sooner if the patient has had a contralateral pneumothorax, or if the patient is engaged in occupation with wide changes in barometric pressure, or in an occupation with high risk to himself or others should he sustain a pneumothorax while on duty. Tension pneumothorax, hemopneumothorax, or bilateral pneumothorax require immediate drainage.

Previous authors have noted that in patients who develop spontaneous unilateral pneumothorax, there is a 10 per cent to 15 per cent chance of their developing a pneumothorax on the contralateral side. It has been noted also that a patient undergoing hospital treatment for unilateral pneumothorax has a 3 per cent chance of developing a contralateral spontaneous pneumothorax during treatment.

The purpose of this report is to present a one-stage operative management of patients with lung pathology which predisposes them to the development of contralateral or bilateral pneumothoraces. The problem can be crystallized by reviewing briefly four classical case histories.

Case 1

AN 18-YEAR-OLD MALE presented in the emergency room with pain in the left side of his chest, shortness of breath, and said he felt he had a pneumothorax on that side. His past history revealed that he had had two previous documented episodes of pneumothorax on that side, and a third episode which was clinically identical. This, then, represented a fourth pneumothorax on the left side.

Chest x-ray *(Figure 1)* revealed a pneumothorax, and also showed evidence of blebs in the apical segment of the contralateral upper lobe. He was managed with a left thoracotomy, ligation of the bleb, and pleurectomy. His postoperative course in the hospital was uneventful. He left the hospital on the seventh day, but returned to the emergency room two weeks later complaining of pain on the right side. He thought he had a pneumothorax on that side.

Chest x-ray *(Figure 2)* confirmed that there was a pneumothorax on the right side, and that the left side was adequately re-expanded. Conservative measures were utilized and an x-ray confirmed that the lung was completely expanded two weeks later.

Case 2

The second patient demonstrates a different approach to a very similar problem. The patient was a 33-year-old white female who presented in the emergency room with a left pneumothorax. This was the third episode of pneumothorax, all having been on the left side.

Chest x-ray revealed that she had bilateral blebs in the apices, and that the right apex was the seat of greater disease than the left (symptomatic) side *(Figure 3)*. The patient was managed by a median sternotomy incision with opening of the pleural cavity on both sides. Wedge resection of the apical bulla, bilaterally, and ligation of multiple blebs in the upper lobes on both sides, and bilateral abrasions, were performed. *Figure 4* is the postoperative x-ray.

Case 3

A 32-year-old intern presented with a 50 per cent pneumothorax on the right side. His past history

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Figure 1. The apical lesions in the left lung (symptomatic side) are obvious.

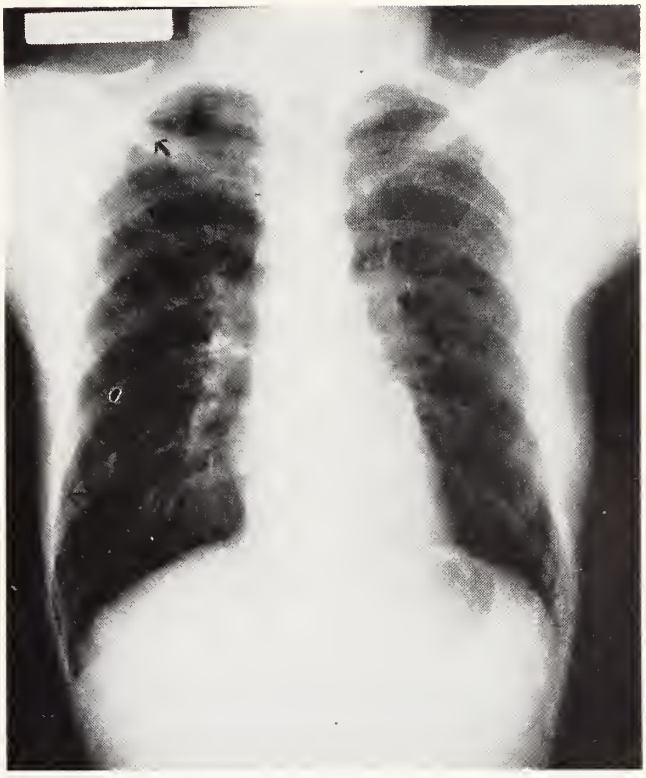

Figure 2. The apical lesions in the right lung are larger than those in the symptomatic side.

showed that in the 1½ years prior to his admission, he had had two documented pneumothoraces on the left side, both treated conservatively. He was treated with closed thoracostomy drainage of his right hemithorax and, although the lung was almost completely re-expanded, the air leak persisted for seven days. At this time, operative intervention was decided upon.

Because he had a persistent air leak on the right side, and had a history of two pneumothoraces on the left side, a median sternotomy incision was made and both pleural cavities opened. The apical blebs and the air leak on the right side were oversewn with running sutures. Other isolated blebs were ligated. On the left side, the apical blebs were ligated and bilateral pleurectomy of the upper half of the hemithorax was performed.

His postoperative course was complicated by a persistent air leak for a week, and by serratia contamination of some pleural fluid in the right hemithorax necessitating reinsertion of a chest tube on that side and aggressive antibiotic therapy. However, when reviewed as an outpatient two months after his operative procedure, he was well and had returned to work.

Case 4

A 24-year-old female had a spontaneous pneumothorax on the left side fifteen months prior to this presentation. This was treated with closed thoracostomy with full re-expansion of the left lung. Three months prior to this admission, she suffered a similar lesion on the right side, treated once again by closed thoracostomy. She now presented with another 50 per cent pneumothorax on the left side which, on this occasion, was treated by medial sternotomy, ligation of apical blebs, bilaterally, and bilateral pleural abrasion. Her hospital stay, following surgery, was seven days.

Discussion

Because cystic pulmonary disease frequently occurs bilaterally, a bilateral approach to the problem of spontaneous pneumothorax has been recommended in the literature previously. The approach recommended has been a lateral thoracotomy, on each side. The morbidity from two incisions can be obviated by the use of the single mid-line incision. If the postoperative morbidity from bilateral pleural exploration through this mid-line incision is outweighed by the advantages of a one-stage bilateral management of bullous disease, this might be the preferred method of management of bilateral bullae with spontaneous pneumothorax.

After the sternum has been divided longitudinally, the pleural cavity on either side is opened by entering through the retrosternal reflection of the parietal pleura. In most cases, the apical blebs are obvious, and any fibrous adhesions that are holding the lung partly attached to the chest wall are divided by sharp dissection, so that the complete lung is mobilized for any further procedures. The blebs can be either li-

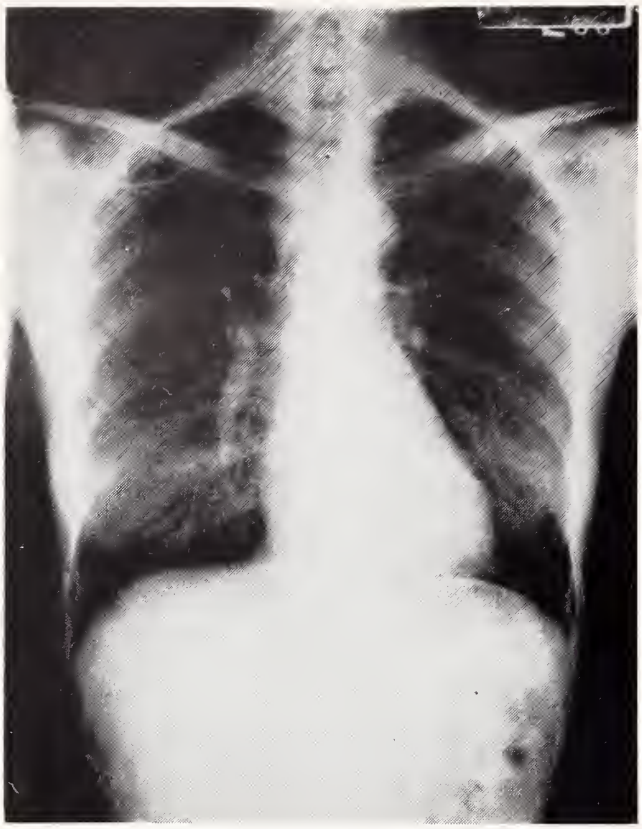

Figure 3. Bilateral blebs in the apices. The right apex is the seat of greater disease.

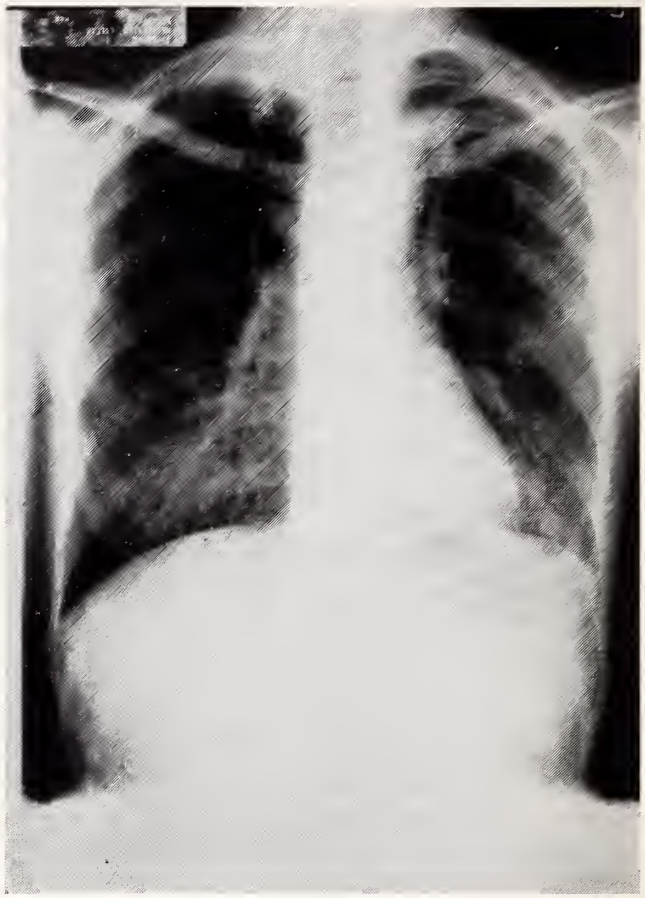

Figure 4. Postoperative x-ray.

gated with silk sutures or, if there is total replacement of a pulmonary segment by bullous disease, this area can be excised by wedge excision, or simply oversewn after a non-crushing clamp has been applied. We feel inspection of the whole lung on both sides is important, lest any bullous lesion be left for development of future air leaks. Multiple ligation of bulla, bilaterally, is mandatory to prevent future air leaks, and pleural abrasion or pleurectomy can easily be performed to promote adherence of the visceral pleura to the chest wall. While either pleurectomy or pleural abrasion is a simple procedure through this mid-line incision, the postoperative pain following bilateral pleurectomy is considerably greater than that of bilateral pleural abrasion. Adequate drainage of each pleural cavity is important, as pleurectomy can be associated with significant blood loss. To this end, two chest tubes are usually used, one anterior to the hilum and the other posterior to the hilum, both being inserted into the hemithorax through the lower lateral aspect of the chest. Suction drainage of these tubes is used by Emerson pumps. Y connectors are used, one on each side, to simplify the drainage apparatus to each Emerson pump. These tubes are usually moved after two to three days, and the patient is ambulated early in the postoperative course.

Cardiac function is not impaired, as the pericardium is left intact at the time of the operative procedure. Some might justifiably criticize the advocation of bilateral thoracotomies for unilateral disease when there is only a 15 per cent chance of developing symptoms on the contralateral side, because of the increased chance of post thoracotomy morbidity (atelectasis, hemothorax, pneumothorax, air leak, empyema, pneumonitis, and wound infection problems following thoracotomy are well known). But the use of median sternotomy has been characterized by a surprising lack of postoperative morbidity in our experience. This incision has been used at this institution in over 1,000 cardiac surgery operations without a single episode of wound infection, and only one episode of wound dehiscence. Prophylactic antibiotics are used routinely. It is felt that operative intervention in obvious cases should be undertaken early in the course of the pneumothorax, rather than as in the third patient, waiting and allowing contamination of the pleural cavity for a week prior to operative intervention. Persistent air leaks tend to increase the chance of infection in the hemithorax.

The use of this bilateral approach via the median sternotomy incision should be attended by certain precautions. To insure adequate expansion of pulmonary segments that have been atelectatic for days or even months due to compression by adjacent large

(Continued on page 352)

Reflux Esophagitis

Prevention of Gastroesophageal Reflux

THOMAS V. THOMAS, M.D., F.A.C.S., *Kansas City, Kansas*

A brief description of a type of fundal plication which has served the author well in controlling gastroesophageal reflux. Good results were obtained in a high percentage of patients.

Reflux esophagitis is a frequently encountered clinical entity. It is believed to be the result of an inadequate sphincter mechanism at the cardioesophageal junction. Although gastric juice refluxing into the esophagus is the most frequent problem, alkaline contents also may produce esophagitis in patients who have had partial or total gastrectomy. A significant number of patients may not have an anatomically demonstrable herniation of the stomach. It is generally agreed that a surgical procedure to create a sphincter mechanism is superior to mere anatomic reduction of the hernia and approximation of the crura. Nissen, Adler, Belsey, Krupp, and several others have reported their clinical experience with fundoplication and long-term follow-up on such patients. During the past three years, I have treated 70 patients with gastroesophageal reflux, 61 of whom had a simplified method of fundoplication, while the remaining nine had a *Roux en Y* type of reconstruction. Except for the one patient who died as a result of anastomotic leak from a concomitant left

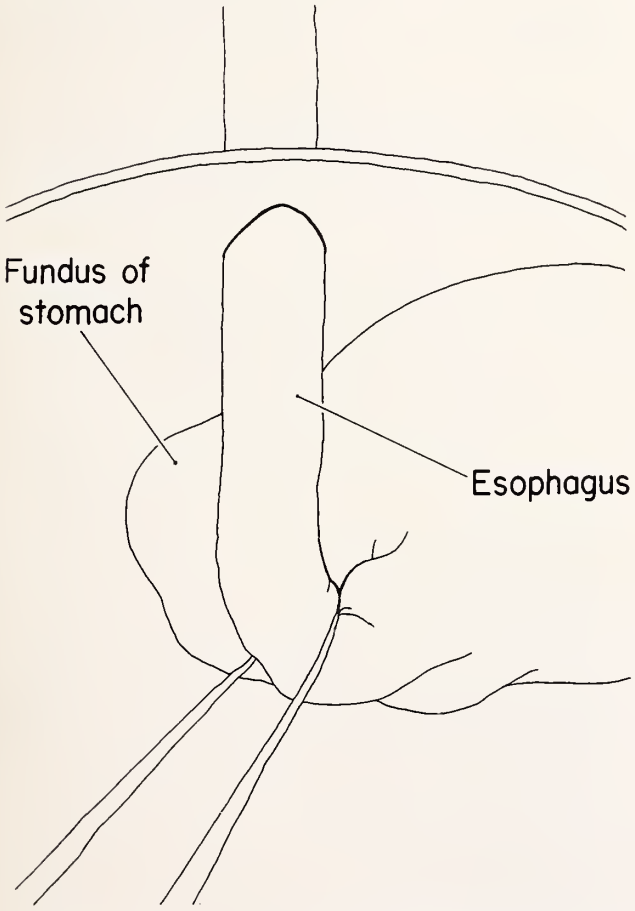

Figure 1. The above drawing illustrates the technique of encircling the distal esophagus and applying gentle traction with fingers or a penrose drain. The superior portion of the fundus is brought medial and posterior to the esophagus. If the crural defect is a large one, approximating sutures may be used.

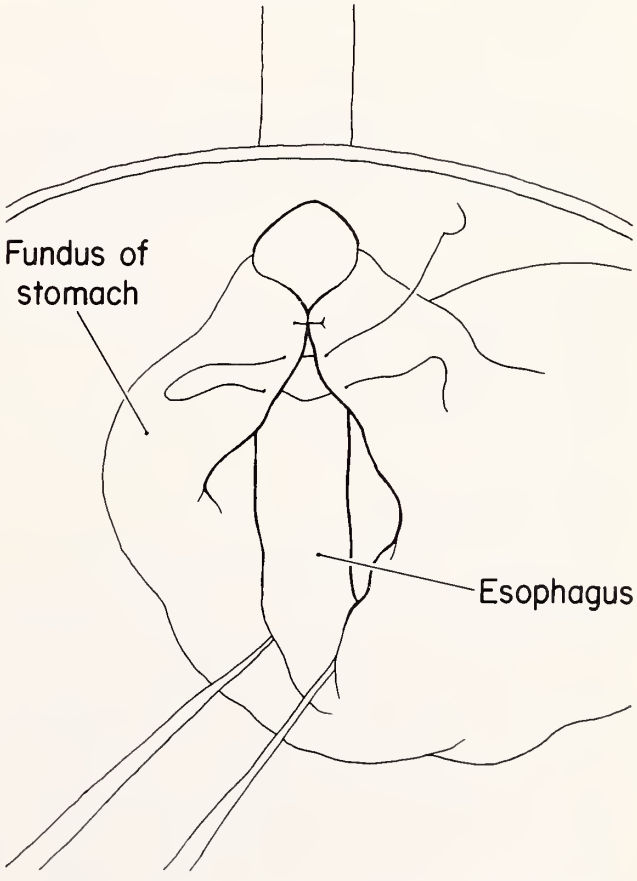

Figure 2. The anterolateral edge of the fundus is brought in front of the distal esophagus and approximated to the segment of the fundus brought posterior to the cardioesophageal junction, using four or five interrupted sutures. These sutures are not anchored to the esophagus. Division of the gastrohepatic ligament and short gastric vessels is not necessary.

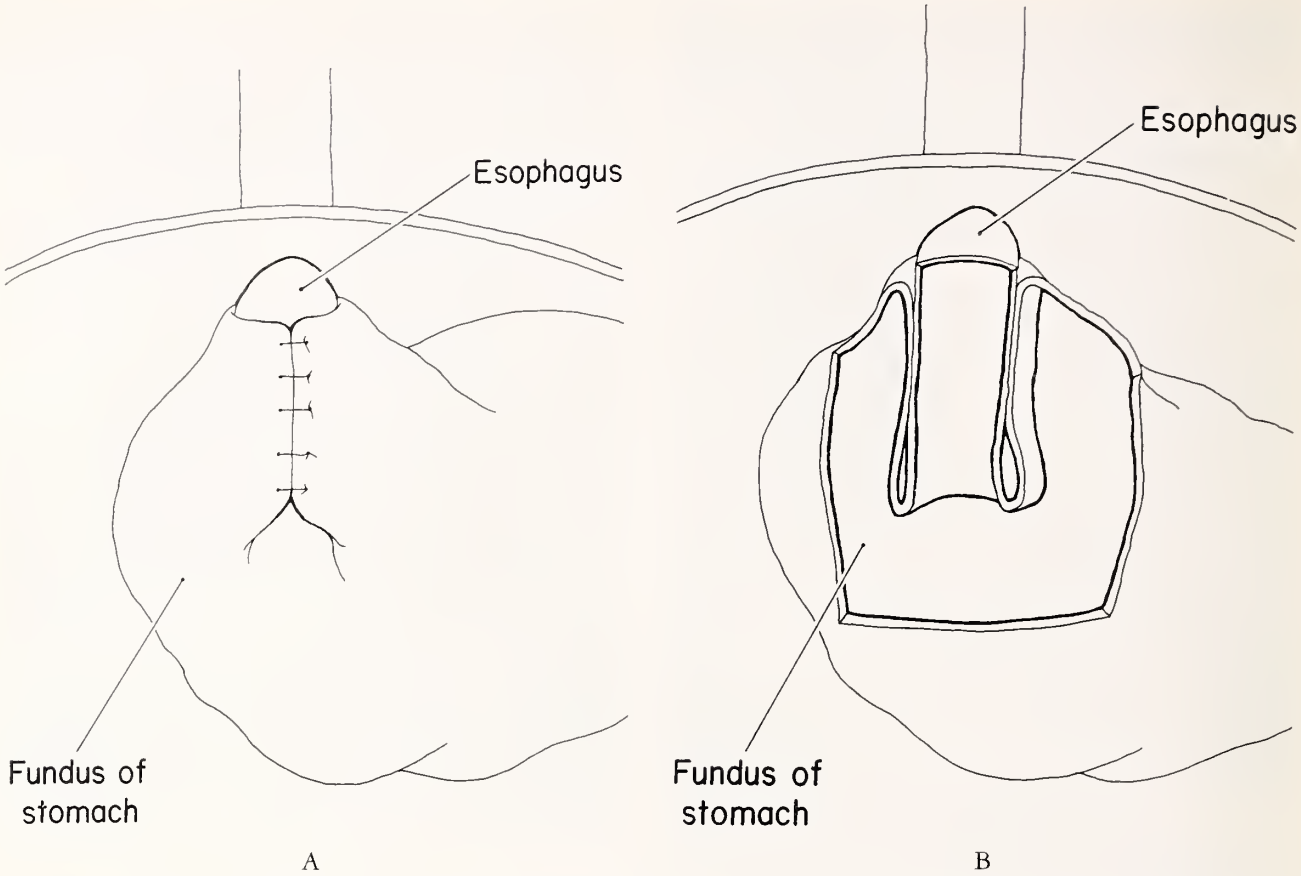

Figure 3. External appearance of the fundoplication and a cut section of the valvular action are shown in the above figures. The plication around the esophagus should be loose enough to admit at least one but preferably two fingers. Preservation of the ligamentous and vascular pedicles helps to maintain the sphincter mechanism at or slightly above the cardioesophageal junction.

colon resection, the others have been followed carefully. Sixty-six patients are considered to have excellent results. Only three patients required postoperative dilatations, and two of them needed only one or two such dilatations for complete relief of symptoms.

Surgical Technique

A mid-line upper abdominal incision, or a right subcostal incision extended to the left costal margin, has been used in this series. The left lobe of the liver is elevated cephalad and anteriorly. After incising the peritoneum, the distal esophagus is encircled by blunt finger dissection. Vagotomy has been added only in those patients where there was evidence of associated peptic ulcer disease. The superior portion of the fundus of the stomach is brought posterior to the esophagus *(Figure 1)*. The anterolateral aspect is then folded over anterior to the cardioesophageal junction and approximated to the posterior fold, using four or five interrupted silk sutures *(Figure 2)*. At the completion of the plication it should be loose enough to admit at least one, but preferably two, fingers between the gastric fold and distal esophagus (*Figures 3A* and *3B*). This valvular mechanism created by the plication is prevented from sliding to the gastric side, because of the preservation of the gastrohepatic ligament and vascular pedicles. Those patients with primarily alkaline esophagitis, following previous vagotomy and gastrectomy, are treated by implanting the afferent limb into the efferent limb 12 to 14 inches from the gastrojejunostomy. The afferent limb is usually divided one centimeter from the gastrojejunostomy, and the stump is closed in two layers.

All patients in this series except one had fluoroscopically, as well as esophagoscopically, demonstrable gastroesophageal reflux and esophagitis. Motility studies on some confirmed the absence or diminution of sphincter mechanism at the cardioesophageal junction. Only 12 patients had vagotomy and pyloroplasty added to the fundoplication. Eight patients had cholecystectomies done at the time of hiatal hernia repair. Five patients had aortofemoral grafts, three patients had endoaneurysmorrhaphy with tube graft, and one patient had left renal artery bypass during their operations for correction of gastroesophageal reflux. Those patients with fundoplication have had postoperative fluoroscopic and roentgenographic

(Continued on page 360)

Student
THESIS

Thyroid Carcinoma: Controversial Problems in Management

THOMAS E. GERAGHTY, M.D.,* *Kansas City, Kansas*

CARCINOMA of the thyroid has a natural history that is quite variable. The progression of the disease varies from a slow growing regional involvement, to a locally invasive process, to distant metastases in lung and bone—all being ultimately fatal. Per cent survival after surgical management varies from 70 per cent to 85 per cent, five-year survivals for follicular and papillary carcinoma respectively, to an almost uniform fatality within one year in cases of anaplastic carcinoma.[1] Without surgical intervention survival periods are markedly decreased. Three per cent of all thyroidectomies done are for carcinoma of the thyroid, and 1 per cent of all malignancies are carcinoma of the thyroid.[2, 3]

It is generally agreed that the primary treatment for thyroid carcinoma should be surgical removal. But the extent of removal and the operative methods vary from partial lobectomy to complete thyroidectomy, and from radical neck dissection to local excision for involved nodes.

Three advanced and unusual cases of thyroid carcinoma will be presented with their primary surgical and medical treatment and their rather long follow-up studies. They will demonstrate a variety of treatments, individually selected, that have been successful in the control of malignant disease that had characteristics associated with a fatal prognosis. A general discussion of thyroid carcinoma and its management will follow.

* This is one of a group of theses written by fourth year students at the University of Kansas School of Medicine, selected for publication by the Editorial Board from a group judged to be the best by the faculty at the School.

Case 1

A 17-year-old white male was referred to KUMC in April, 1960. Two weeks prior to admission, the patient had a chest x-ray revealing extensive diffuse pulmonary metastases. An anterior cervical node biopsy had shown metastatic papillary and follicular adenocarcinoma of the thyroid.

Physical examination revealed a firm, movable, non-tender nodule in the superior pole of the left lobe of the thyroid with non-tender, anterior cervical node enlargement on the left. The physical examination gave no other unusual findings. The patient's past medical history was significant in that shortly after birth he was believed to have had an enlarged thymus, and received five irradiation treatments, type and quantity unknown.

Chest x-rays at this admission showed many small nodular shadows scattered throughout both lung fields, consistent with extensive metastatic disease *(Figure 1)*. Radioactive iodine uptake was within normal limits with only a slight increase over the lungs. Other laboratory values were normal. The treatment planned included ablation of the thyroid gland, stimulation of residual thyroid and neoplastic tissue, and its destruction by intrinsic and extrinsic irradiation.

A total thyroidectomy was done. Operation showed the thyroid replaced with a nodular mass of tissue extending through the capsule and invading the adjacent tissue. There was direct invasion of surrounding nodes, skeletal muscle and superior mediastinum, with involvement of both recurrent laryngeal

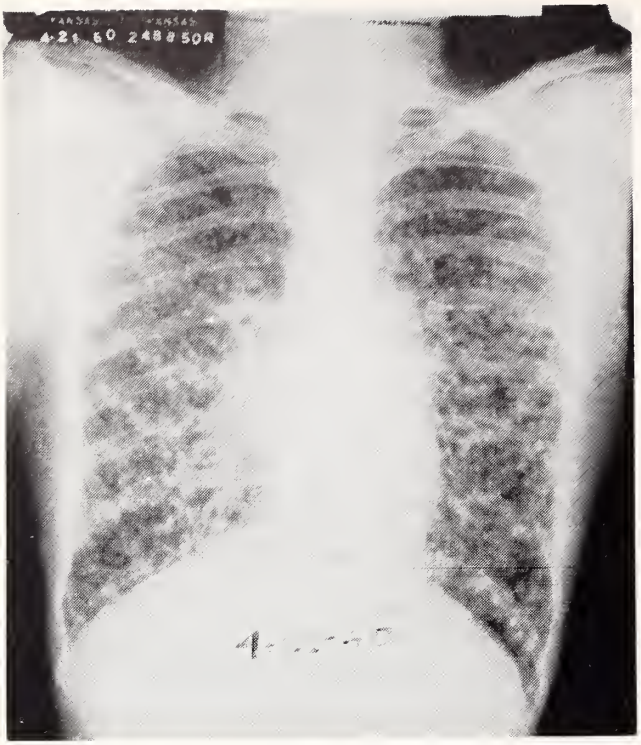

Figure 1. Case 1. Chest x-ray consistent with metastatic carcinoma of the thyroid, April, 1960.

Figure 2. Case 1. Thyroid section showing metastatic mixed follicular and papillary carcinoma of the thyroid.

nerves. The entire thyroid was removed, sparing the right parathyroid glands and trimming tumor tissue from both laryngeal nerves. The histologic examination of the tissue showed invasive mixed follicular and papillary adenocarcinoma of the thyroid *(Figure 2)*. The patient did well postoperatively. Two days later he was given 15 units of thyroid-stimulating hormone (TSH) for five days. He then received 55 mc of Iodine-131. Although there had been only slight uptake of I-131 in the lungs preoperatively, it was thought that this therapy was worthy of trial. The patient was discharged in good condition and was given 180 mgs of dessicated thyroid daily as suppressive therapy. During the next two months, the patient received 6,000 rads to the mid-portion of the neck and surrounding nodal areas.

During the first postoperative year, the patient was relatively asymptomatic. He had slight exertional dyspnea, a stable weight, and no evidence of thyroid deficiency. He developed some hoarseness during this year, was laryngoscoped and found to have left recurrent laryngeal nerve paralysis. Interval chest x-rays showed only slight reduction in density of the metastatic shadows, and I-131 uptakes were below normal limits. Physical examination revealed no evidence of local or regional recurrence of the tumor.

The patient's physical status remained stable until June 1963, three years after total thyroidectomy, at which time some firm palpable nodes along both anterior cervical triangles were discovered. Chest x-rays, I-131 uptake, and the remainder of the physical examination revealed no significant change from previous studies. Bilateral excision of these nodes was done. There were firm adherent nodes along the carotid sheath bilaterally. Histologic examination showed metastatic follicular and papillary adenocarcinoma of the thyroid. He was discharged in good condition.

From that time until June 1971 the patient has been asymptomatic. He has been normally active and gainfully employed. No palpable masses or nodes have been noted. He has remained on 180 mg of dessicated thyroid daily. I-131 scans have shown no interval changes, and chest x-rays reveal some calcifications of the pulmonary lesions. It has now been 11 years since the time of total thyroidectomy.

Case 2

A 53-year-old white female was admitted to the Neurologic Surgery Service at KUMC in December 1955 with a complaint of weakness and stiffness in both lower extremities. Symptoms began one year prior to admission, when she developed awkwardness in walking. This progressed to numbness of the legs with sciatic radiation of pain. The patient had no loss of bladder or bowel function, but spent most of the time in a wheel chair because of dysfunction of the lower extremities. Seven months prior to admission, the patient was admitted to another hospital with similar complaints. A myelogram was done, which was said to have shown a questionable spinal obstruction. No surgical treatment was advised. A diagnosis of multiple sclerosis was made. Because of continued impairment of function, she sought additional help at this hospital.

Twenty years prior to admission, the patient was noted to have a goiter which had not changed in size since its discovery. Physical examination revealed

both lower extremities to be weak, with a sensory level between T-12 and L-1 bilaterally, marked impairment of vibratory and position sense, hyperactive deep tendon reflexes, bilateral clonus and Babinskis, and tenderness to percussion at T-12. The entire thyroid was noted to be nodular and enlarged. Dorsal spine x-rays showed a questionable loss of bone density at T-12. A myelogram revealed a total block at the level of T-12; other laboratory results were normal.

A laminectomy of T-10, 11, and 12 was then done. A vascular and fleshy appearing tumor at the level between the lamina at T-11 and T-12 was found. The nerve roots, adjacent paraspinal muscles, and the lamina of T-11 were invaded and replaced by tumor with compression of the cord. An extensive resection was not attempted because of the extent of the tumor and the likelihood of interference with the vasculature of the cord. The histologic diagnosis of metastatic follicular adenocarcinoma of the thyroid was made *(Figure 3)*.

Postoperatively the patient did well and her symptoms and findings improved. I-131 uptake studies showed a 5 per cent uptake in the thyroid, and 10 per cent in the spine at the level of T-11. A total thyroidectomy was then done, but there was no evidence of carcinomatous change grossly. Microscopic sections revealed nodular colloid goiter with no histologic evidence of carcinoma.

Postoperatively the patient was placed on 400 mg of Propylthiouracil daily for 30 days in order to induce hypothyroidism. It was hoped this would increase the affinity of the tumor tissue for the iodine. One month later, the patient received 100 mc of I-131. There was a significant uptake at T-11 and there was evidence of functioning thyroid tissue in the left lower neck.

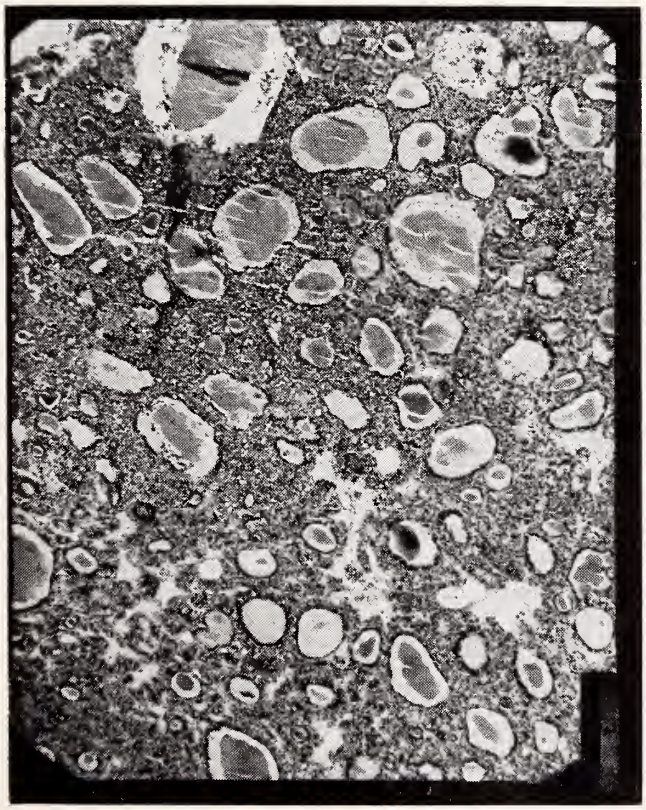

Figure 3. Case 2. Metastatic follicular adenocarcinoma of the thyroid from tissue removed at T_{12}.

Two months later, the patient presented with a palpable mass in the left lower thyroid area. She had no signs of myxedema and was free of symptoms. Repeat I-131 scan showed no uptake in the region of the mass. Subsequently, a 4 cm spherical encapsulated mass next to the trachea was excised. It appeared to be a thyroid implant with none of the usual anatomical connections of the thyroid. Microscopic examination revealed a metastatic follicular adenocarcinoma of the thyroid without capsule invasion. Spine x-rays showed no new evidence of bony destruction. All other laboratory tests including a chest x-ray were normal.

The patient has done well in the succeeding years, has been asymptomatic, has shown no evidence of recurrence, and is without neurological deficits. She has been sustained adequately on 180 mgm of dessicated thyroid per day. It has been 16½ years since the onset of her symptoms, and eight years since her last treatment was given.

Case 3

An 18-year-old white female was referred to KUMC in February 1961 for recurrent carcinoma of the thyroid. Two years prior to admission a nodule was noted in the right lobe of her thyroid. This was excised and showed changes consistent with carcinoma of the thyroid. The patient then received irradiation, type and amount unknown, to the cervical region. The patient did well until three months prior to admission, when a nodule in the right lobe of the thyroid was noted to be increasing in size. A partial right thyroid lobectomy was done two weeks prior to admission, revealing papillary adenocarcinoma of the thyroid. The patient was then referred to KUMC.

She had received x-ray treatments to the face and neck at the age of four for impetigo. Physical examination showed a healed transverse thyroid incision with moderate induration and radiation skin changes. The right lobe of the thyroid was absent, and the left was enlarged and woody in consistency. Large palpable nodes were noted in the anterior cervical chains bilaterally. The remainder of the examination plus laboratory studies, including I-131 uptake, and x-rays were normal.

A total thyroidectomy plus removal of the adherent right strap muscles and contiguous right and left lymph nodes was then done. At operation, a nodular mass extending posterior to the trachea and

surrounding the esophagus was noted. This was excised, as was the right recurrent laryngeal nerve which entered the neoplastic mass. The nodular left lobe was also removed along with palpable nodes. At no time was there evidence of transection of tumor tissue. Histologic findings were of invasive mixed papillary and follicular adenocarcinoma of the entire thyroid with involvement of five of five nodes.

The patient subsequently did well and was maintained on 180 mgm of dessicated thyroid per day. Except for diminished voice range and minimal hoarseness the patient was asymptomatic until three months postoperatively, when a large 3 cm mass was noted in the right anterior cervical triangle. Subsequent surgical removal of this mass and adjacent nodes showed metastatic follicular and papillary adenocarcinoma in five of eight lymph nodes.

Six weeks later, the patient presented with a palpable node in the left anterior cervical triangle. Surgical excision with other local nodes revealed the same pathological findings involving one of five nodes.

Thirty days later and six months postthyroidectomy, the patient began a 30-day regime of radiation treatments with 6,000 rads delivered to the neck and surrounding areas. One month after radiation treatments had ceased the patient again presented with adenopathy, this time in the right supraclavicular area. These increased in size in the next 30 days, and surgical excision of the right scalene fat pad and local and cervical nodes was done. Of the nodes removed, six of eleven showed pure follicular adenocarcinoma of the thyroid.

Eleven months following this, two nodules were noted in the right submandibular region typical of nodal involvement. The patient was asymptomatic and all laboratory and x-ray studies were normal. The two nodes were then excised, but showed only reactive hyperplasia with no evidence of metastases.

The patient has been followed for the last nine years remaining symptom-free with no evidence of recurrence. A euthyroid state is maintained by 180 mgm of dessicated thyroid per day. All follow-up studies have been normal. It has now been 12½ years since the patient was initially operated on for thyroid carcinoma.

Classification of Thyroid Carcinoma

Woolner *et al.*[4] have reported 885 cases of thyroid carcinoma seen during a 30-year period, and proposed a widely used simple classification for thyroid carcinoma. There are four main types: (1) papillary carcinoma; (2) follicular carcinoma; (3) solid carcinoma with amyloid struma; and (4) anaplastic carcinoma. Papillary carcinoma occurred in 61 per cent of the cases; it was the most readily curable. Regional nodes were involved in approximately 40 per cent of the cases with distant metastases being uncommon. Follicular carcinoma was found in 18 per cent of the cases. Metastases were most commonly in lungs and bone and infrequently in regional lymph nodes. Solid carcinoma with amyloid struma was present in 6 per cent of the cases with marked involvement of regional nodes. It grew slowly. Anaplastic carcinoma occurred in 15 per cent of thyroid malignancies and was a rapidly and uniformly fatal disease.

Russell *et al.*[6] reported that 50 per cent of their cases had mixed papillary and follicular carcinoma. Mixed types are usually incorporated into Woolner's classification according to the predominant cell type. In two of the three previous case presentations a mixed follicular and papillary carcinoma was present. Our two cases (1 and 3) had no predominance of either cell type. Therefore, they are classified as simply mixed follicular and papillary carcinoma of the thyroid.

Irradiation as a Causative Factor

Cases 1 and 3 had previous irradiation to the head and neck as children; one for an enlarged thymus, the other for impetigo. Irradiation to the head and neck has been indicated as a causative factor in carcinoma of the thyroid since 1950, when Duffy and Fitzgerald[6] followed 28 children with carcinoma of the thyroid, ten of whom had received previous irradiation. Beach and Dolphin,[7] using personal data as well as that from the literature, calculated that 1 per cent of those who received 200 to 350 roentgens to the head and neck subsequently developed carcinoma of the thyroid. Those receiving larger doses, from 500 to 900 roentgens, had an incidence up to 1.6 per cent. Block, Miller and Horn[8] found that 14 per cent of 296 patients with carcinoma of the thyroid had irradiation to the head and neck preceding the occurrence of the cancer.

Although carcinoma of the thyroid has a potentially fatal outcome, Hempelmann *et al.*[9] state that all their patients with carcinoma following irradiation were alive from 4 to 13 years, suggesting a relative benignity of the carcinoma following irradiation. Wilson, Platz, and Block[10] had similar rates of long survival in 61 patients who had cancer occur after irradiation. The carcinoma was characterized by local invasion (60%), high recurrence rate (39%), low mortality (5%), and a prolonged clinical course (10 year survival 98%). They also reported the first recognition of a phenotypic predilection in their series favoring the development of this disease in the female (80%) with blood type A (60%), and a decreased incidence in patients with blood type O (18%). The young woman in Case 3 had blood type A.

Two of the three cases presented had previous irradiation, suggesting some causal relationship in their disease. They also had local invasion, high recurrence rate, a prolonged clinical course, and one had type A blood compatible with the findings that Wilson made in reviewing his cases.

Metastatic Sites and Their Treatment

Each of the three cases reported had some evidence of local or distant metastases to the lungs, regional nodes, and bone. The treatment of metastases is controversial.

Carcinoma of the thyroid has many sites of metastases. Silverberg, *et al.*[11] found from autopsies of patients who died from thyroid cancer that local nodes and the lungs were the most frequently involved sites of metastases. Other less frequently involved sites of metastases for papillary and follicular carcinoma are bone, pleura, adrenals, liver, kidneys, pancreas, brain, spleen, dura, and bowel. All of the cases reviewed at autopsy had widespread metastases that were not clinically or medically evident prior to death.

Although metastases to the lung can cause a rapidly fatal outcome, there have been reported cases of survival with widespread metastases for many years. McGee and Warren[12] have reported a patient surviving 24 years with extremely widespread metastases to the lungs from papillary adenocarcinoma of the thyroid. Knowles[13] also reported on a patient with a 28-year history of small nodular densities in the lungs due to thyroid carcinoma. Others, such as Llewellyn, *et al.*,[14] and Barrett and Stenberg[15] have reported cases with multiple pulmonary metastases from thyroid carcinoma not detected by chest roentgenogram, but demonstrated by chest and whole body I-131 scintiscan. They found 3 per cent of 509 cases with papillary thyroid cancer and 11 per cent of 157 cases of follicular thyroid carcinoma with evidence of widespread pulmonary metastases demonstrated by I-131 scans. They recommend chest scan using I-131 in all cases of carcinoma of the thyroid.

Most authors concur with the general treatment for lung metastases as Andrews and Minty[16] and Dargent[17] have recommended. This includes ablation of the thyroid by total or near-total thyroidectomy followed by a therapeutic dose of 140 mc of I-131. Only those with well differentiated tumors, including papillary type, obtained any benefit from this treatment. Although our patient had widespread metastases to the lung evident on chest roentgenogram, there was little uptake of I-131 in the lung fields. He was, however, given a dose of I-131 following total thyroidectomy. He was then maintained on suppressive doses of dessicated thyroid in the hope of suppressing the metastatic sites. This is the recommended form of treatment for such metastases and seems to have been successful.

Vertebral metastases are less common than those to the lungs in patients with carcinoma of the thyroid. They are usually present as in the cases Passerini and Bertazolli[18] reviewed, in which four of five patients' initial manifestation of their disease was from the vertebral metastases. This was also the initial manifestation in Case 2. The pain was at first localized and later took on the character of root pain. This is explained by local invasion from the substantia spongiosa to the periosteum, producing periosteal pain which later regresses and is followed by pain from compression of the roots and dorsal nerves, due to collapse of the cortical portion of the vertebrae. In all their cases, the posterior aspect of the vertebral body is hollowed out and the cortical portion has almost disappeared. Removal was only possible in one of five cases, two of the patients were not operated on, and in two of the cases the operations were confined to decompressing and freeing the roots, as was done in the laminectomy in Case 2. All of the patients operated on were well two to four years postoperatively with reduction of symptoms. They state in their cases that surgery is undoubtedly advantageous in vertebral locations, and that myelography is also important in localizing the compression site. All of their patients operated on subsequently received either I-131 or local irradiation with apparent benefit. Case 2 received only I-131 with complete relief of her symptoms subsequent to operation.

Copeland[19] does not recommend external irradiation of bone metastases from carcinoma of the thyroid because of its high radio resistance. I-131 is recommended, although only about 20 per cent of metastases show sufficient affinity for iodine to expect treatment to be effective. The affinity of iodine parallels the presence of colloid, the highly cellular tissue devoid of follicles being unlikely to assimilate iodine in sufficient quantity for it to have therapeutic value. Total removal of the thyroid also may stimulate function of the metastases with affinity for iodine. The administration of thyrotropic hormone after thyroidectomy seems to enhance the concentration of I-131 in the metastases enhancing therapeutic value.[19, 20]

It is generally agreed that after near-total or total thyroidectomy in patients with metastases, suppressive doses of dessicated thyroid are indicated. All three of the cases presented with their local and distant metastases were maintained on such a regimen satisfactorily.

Surgical Management

A. *Multifocal Sites*

Although the three patients presented all had

advanced disease and total thyroidectomy was done, there is still controversy concerning the amount of gland to be removed when there is a lesser degree of involvement. Clark, Ibanez and White[21] believe that only total thyroidectomy (but sparing the parathyroids) constitutes an adequate procedure for all cases of cancer of the thyroid. Of the cases they reviewed, 56 per cent had cancer in both lobes of the gland. Rose *et al.*[22] made a follow-up study of patients treated for thyroid cancer with an ipsilateral lobectomy and found 35 per cent of their patients returned with carcinoma in the contralateral lobe. Russell *et al.*[5] found 87 per cent of their patients had intraglandular dissemination into the isthmus and opposite lobe. Black *et al.*[23] reported multicentricity in at least 20 per cent of 328 cases of thyroid carcinoma which were not evident on gross examination.

Clark, White and Russell[24] made a meticulous study using routine procedures compared with whole organ studies in carcinoma of the thyroid, and found bilaterality in 30 per cent of the cases under routine procedures and 88 per cent bilaterality in the special whole organ studies. They also studied cases in which a subtotal or simple lobectomy had previously been done on a primary focus of thyroid carcinoma, and found that 30 per cent showed extension beyond the primary focus when routine examination was used, but 91 per cent of the cases showed extension when whole organ sections were used. James and Thurston[25] reoperated on 26 patients with carcinoma of the thyroid. They found that 50 per cent of the cases had tumor bilaterally although not evident on physical examination.

It seems from this data that subtotal thyroidectomy or unilateral lobectomy are incomplete operations.

B. *An Adequate Operation*

Differences of opinion concerning what constitutes an adequate operation for carcinoma of the thyroid is probably related to six principal reasons: (1) A wide variation in the natural history of the disease; (2) Variation in the differentiation of the tumor; (3) Occurrence of multiple cell types in individual tumor; (4) Variation in response to suppressive therapy; (5) Variation in the metabolism of the tumor permitting use of intrinsic radiotherapy, and (6) Because of the slow growth of some tumors, a long follow-up is required.[26] These factors make the individualization of treatment advisable.

There is continued controversy concerning the place of radical neck dissections for treatment. Proponents such as Russell *et al.*,[5] Buckwalter,[26] Hirabayashi and Linsay,[27] and Glass[28] believe that classical radical neck dissection is indicated when regional lymph node involvement occurs. Others do not advise radical neck dissections, unless the nodes are involved with cancer other than papillary type.[1]

Proponents of a more conservative neck dissection, sparing the deep jugular vein, the sternocleidomastoid muscle, and the accessory nerve include Crile,[29, 30] Rickey and Howard,[31] Hill,[32] Cline,[33] and Mustard.[34] They believe there is no justification in employing classical radical neck dissection. They employ extensive and carefully planned conservative operations when nodal involvement occurs. Most include the use of I-131 and external irradiation when nodal involvement occurs.

The work of authors such as Frazell and Foote[35, 36] and James[37] suggest that radical neck dissection does not alter mortality rates for carcinoma of the thyroid in patients under 40 years of age, but halves the mortality in patients over 40. In the cases we have reported, classical radical neck dissection was not done and the disease seems controlled.

Summary

A presentation of three unusual cases of thyroid carcinoma, their surgical and medical management, and their 10- to 14-year follow-ups has been made. These cases illustrate many of the controversial issues remaining regarding cancer of the thyroid. With adequate surgical and medical care these patients, with seemingly hopeless diseases, are living active and productive lives free of symptoms and recurrence. Discussion of the classification of thyroid carcinoma, irradiation as a causative factor, multifocal sites of cancer in the gland, plus the effectiveness of persistence in treatment have been presented.

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The President's Message

Progress

Healers have progressed a long way in their dealing with government since the days of Babylon. The first record of "The Doctor and the Law" spells out carefully—a physician who treats an eye or a hand and fails to save it, shall lose his own eye or hand. Physicians must have been extraordinarily reluctant to treat the most serious levels in those times. Many eyes and limbs must have been lost by the resulting therapeutic timidity engendered by such well intentioned but repressive legislation.

Over four thousand years, the steady pressure from our compatriots has eroded away much of the malignancy of such rules. Today, given the patient's informed consent, sanction of a license, and the approval of only our peers, we may essay to treat anything, by any means which seem logical. This pressure should not be abated now.

Even in the last few years, here in our own state, our collective effort has modified the law for the patient's benefit. For example, we may, in an emergency, treat minors without parental consent (but not without a court order if parents forbid). We may play the Good Samaritan without fear of later legal action. The proceedings of hospital committees are held now to be beyond the reach of curious attorneys. Death itself is defined in such a way as to remove physicians from censure where organs are to be removed for transplantation.

Next year, with the aid of the allied medical professions, the architects, and some of the lawyers, we have great hope of making the malpractice laws less onerous. We think the legislators are aware of the waste and potential harm to the public by the practice of "defensive medicine." Your Kansas Medical Society, with the help of all its members, continues to work for the betterment of health care through advice to its friends in the legislature. It does for you what you would like to do, but cannot do alone. Help

it—get on a committee, urge your colleagues to become more active.

Within practical limits, the commission chairmen will appoint you to any committee you wish. Grab your phone and call any of us, and we will transmit your request. The number is 913-235-2383.

Kenneth L. Graham MD

President

Thyroid Carcinoma

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Thoracotomy for Pneumothorax

(Continued from page 342)

bulla, intraoperative and postoperative positive pressure ventilation via an endotracheal tube and respirator for several hours is important, until the patient is able to cough and breathe effectively. Negative suction in conjunction with underwater sealed drainage is helpful in the reexpansion of the lungs and provides adequate drainage of any pleural fluid or blood.

Summary

A more aggressive bilateral approach to chronic pulmonary disease is discussed. A more definitive approach to bilateral disease can be achieved by using this mid-line incision. This seems a less traumatic and a more efficient management of bilateral pulmonary disease than sequential unilateral thoracotomies.

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Editorial COMMENT

Yin Equals Yang

We have been overlong in addressing ourselves to one of the burning issues of the day, the status of the female. We do so now with the realization that our comments will interest few and influence fewer, but can only plead that few individuals with access to publication have resisted the impulse as long as we have. We lay no claim to special qualification to comment, other than having sired and intermittently assisted in the care and feeding of two examples, and having spent 25 years attending a number of others of various size, shape, and capability.

First, we make the traditional disclaimer that we realize that numerous instances of inequity, injustice, lack of appreciation and recognition directly based on sexual prejudice toward the female have occurred—and are still occurring. Queens have died because the king was sterile or too plentifully supplied with X-bearing gametes. Girl babies have been disposed of by exposure to the elements or sale to the highest bidder from prerecorded time. Pseudoscientific studies have testified to the inferiority of the female, and consequently her capabilities, particularly intellectual, and her accomplishments, particularly non-domestic, have been discounted or credited to the male. The double standard of recognition, reward, and remuneration has been a matter of fact, and if the current wave can to some degree correct these, perhaps it will justify some of the carping and nit-picking that has characterized the current struggle. We have no expectation that the Battle of the Sexes will ultimately be decided in favor of either side, but perhaps we can get the negotiations on a higher level than, say, the shape of the table.

Having thus indicated our empathy for the female, we suggest, with admitted temerity, that if women do occupy a degraded position and are the victims of injustice and prejudice, if they have been subjugated and exploited, they must bear some of the responsibility themselves for these conditions. Fundamentally, man (collective) is biological and his destiny has been determined by two biological principles, reproduction and maintenance. As the herd became the tribe and the tribe the nation, he—and she—have applied some sophistication to both efforts, but the pattern was long ago established. If his mobility and freedom from domestic restrictions permitted him a superficially dominant role in the group function, she was busy at home laying the groundwork for attitudes and behavior patterns that influenced direction and subsequent action. The bedroom, nursery, and kitchen have shaped our world as much as the board room, the parliamentary hall, or the battle field. The domestic balance created by these traditional obligations has been considerably altered in the last century by emancipatory processes that not all women find to their liking. It has come largely because of a breakdown in family structure as we have known it. The divorced mother, for example, formerly suffered social ostracism (originating from other women more than men) and usually had to struggle to maintain the family group by domestically oriented work or some mother-role extension, such as teaching. Now, increasingly, she is not waiting for the stimulus of divorce or widowhood to leave the domestic area for the professional or commercial world and duties increasingly competitive with the male function. If opportunity and remuneration have been slow in reaching parity with the male standard, it is because her change of status has not been the product of prior preparation for the role and superior capabilities which have competitively displaced men but the practical necessity to survive, hence the necessity to gain admittance by accepting inferior remuneration and status.

All this has nothing to do with the comparative intellects of the sexes. The traditional domestic role may not utilize all of a woman's intellectual talents, but failure to utilize them has resulted in her restriction to the role of being forced, unprepared, to compete in the marketplace with those whose roles have prepared them. The cynic (male) would say that if woman had really suffered the indignities of the inferior position all this time, that in itself proved her inferiority. We do not propose that she accepted her role—which was not and is not truly inferior—through inferior intelligence (lesser education and motivation, perhaps), but as much by her own choice as by any concerted effort of the male to keep her in her place. Where man is direct and pragmatic, woman

is indirect and manipulative, and we suspect that the majority seek, rather than to exchange roles *in toto*, to trade off certain features. The change in woman's status is, of course, much more complicated than this and inextricably interwoven with many other changing concepts in our social structure. But we believe the change is not really so great and that some benefits will be achieved for all (men included), and that many women will be pleased to continue their traditional roles and others will happily return to them after a fling at the alleged freedoms. Such is biology.

If this dissertation has any laudable purpose, it is to suggest to the forces of female liberation that they look to the women in the field of medicine for examples of the successful assault on the male bastion. Female physicians have suffered all the indignities and rebuffs attendant to the invasion of a male-dominated area, and have achieved recognition and acceptance for one reason: demonstrated competence. The Blackwellian spirit is strong, and there are undoubtedly pockets of male resistance, but the place of women in medicine is secure and growing. We offer the heresy that the *average* female physician is superior to the *average* male physician if only because she reached the same goal by greater effort against greater odds. This, of course, is a superiority which will disappear when women seek and enter medical education and practice on a totally equal basis with men, just as any area of superiority engendered by necessity to overcome established resistance is nullified when the resistance no longer exists. Equality of opportunity, whether based on sexual, racial, or any other criteria, invites the equality of mediocrity.

Meantime, research offers some comfort to the female who feels herself abused. It is becoming evident that femaleness is the basic nature of things. Without the proper genetic signal, we would all remain female—at least as long as the present supply lasted. Men, it seems, are only converted females which may, somewhere deep in the limbus, have created the neurohormonal climate which made males struggle to achieve their imagined superiority. There is evidence to indicate that the brain is primarily female, unless and until it is hormonally seduced into thinking male. The Earth Mother is no mythological legend.

Female chauvinists (Nicholas must be thoroughly fed up with the way his name has been bandied about in recent years) will resent what they interpret as a patronizing attitude in these remarks, but they will have missed the point as do most militant adherents of any cause. We like women and admire them, not only because of their accomplishments but because they're women. Some of our best friends are women. But, apropos the liberalized sexual attitudes of the day, would you want your sister to marry one? Now *there* is equality.—*D.E.G.*

DRUG ABUSE PREVENTION

"Tips on Drug Abuse Prevention for the Parents of a Young Child"—a brochure encouraging parents to instill healthy attitudes and habits in their children with regard to drugs—has been published by the National Institute of Mental Health, a component of HEW's Health Services and Mental Health Administration.

In announcing the availability of the brochure, Dr. William E. Bunney, Jr., Director of the Division of Narcotic Addiction and Drug Abuse, said: "This pamphlet is part of a major effort by the Institute to prevent drug abuse among children. We are becoming increasingly concerned with reports that younger and younger children are becoming involved with dangerous drugs. We think that developing appropriate attitudes in children about all drugs, beginning at the earliest possible age, may help reverse this trend."

"Tips" provides information to help guide parents in starting to prevent the misuse of drugs by their children. For example, the booklet tells parents not to place undue emphasis on the taste or effect of a medicine. A child needs to develop confidence in his parents and the doctor that the medicine is necessary and not to be taken as a delightful experience.

The booklet also stresses the importance of parents setting a good example by showing a child that they can stand a certain amount of pain or emotional upset without turning to drugs or drink for a quick relief every time.

For a copy of "Tips on Drug Abuse for the Parents of a Young Child," DHEW Publication No. (HSM) 71-9066, send a postcard to the National Clearinghouse for Drug Abuse Information, Post Office Box 1080, Washington, D. C. 20013.

Council Meeting

Report of Meeting Held May 7, 1972

The Council was called into session at 12:00 noon on Sunday, May 7, 1972 at Reuben's Restaurant, Salina, by Dr. William J. Reals, President.

Present were Dr. W. J. Reals; Drs. John N. Blank, Thomas P. Butcher, Francis T. Collins, Clair C. Conard, Kenneth L. Graham, Chester M. Lessenden, Jr., John C. Mitchell, Lucien R. Pyle, Thomas F. Taylor, and Emerson D. Yoder (Officers).

Also present were Drs. Wayne O. Wallace, District #1; John D. Huff, District #2; Donald J. Smith, District #3; W. G. Rinehart, District #4; Gerald L. Mowry, District #5; Donald R. Pierce, District #6; E. G. Campbell, District #7; Spencer C. McCrae, District #9; Richard M. Glover, District #10; Warren E. Meyer, District #11; Vernon W. Filley, District #12; Eugene T. Siler, District #13; H. W. Hiesterman, District #16, and Galen W. Fields, District #17.

Also present were Drs. Cyril V. Black, Pratt; H. Thomas Gray, Wichita; Norton L. Francis, Wichita; Delmont C. Hadley, Ottawa; Richard H. O'Donnell, Clay Center; Richard Palmer, AMA Board of Trustees, Alexandria, Virginia; Lew W. Purinton, Wichita, and Evan R. Williams, Dodge City. Also present were Mr. Hank Parkinson, Mr. Jim Agin, and Mr. Oliver E. Ebel.

It was announced that Mr. R. G. Swenson resigned his position with the Society, and that he would not be present at this meeting.

The minutes of the October 31, 1971 meeting of the Council were approved.

The following nominations were officially confirmed:

Blue Cross Board: Leonard W. Johnson, Leavenworth, second term; Glen E. Kassebaum, El Dorado, second term; Anol W. Beahm, first term; J. Warren Jacks, first term.

Kansas School Health Advisory Council: Richard H. Greer. A contribution of $500 to this council was approved.

There was discussion concerning the appointments to the *Kansas Board of Healing Arts*. A list of names will be sent to the Governor.

Dr. Norton L. Francis gave the KaMPAC financial report. He stated that KaMPAC today has more members than at any other comparable time. He also said, there was no list of candidates which KaMPAC will support in the upcoming elections, but that such a list will be prepared. Dr. Francis also announced that his term, as Chairman of the Board, had expired and that he was not eligible for reappointment.

Mr. Parkinson reported on the education-information activities of the Society. Among other accomplishments, many fillers and 55 releases were issued during the year. There were approximately 20,000 free radio spots used by Kansas stations. The media now requests stories from the Society.

It was announced there were nine physicians who had not paid their 1971 AMA dues, but who had tried to pay their 1971 Kansas dues. The following resolution was adopted:

> *Resolved,* That the Executive Committee respectfully requests the Council to reconsider its previous actions and in the interest of conciliation toward those physicians who wish to retain their Kansas Medical Society membership but cannot in conscience support the AMA, the Council rescinds its stand on Resolution 71-1 and authorizes the Society to accept 1971 dues to the Kansas Medical Society for those members who wish to pay their state dues, but do not wish to pay AMA dues.

The Council endorsed the Crippled Athlete Program, and expressed hope that physicians will cooperate with individual athletes as may be requested.

The Council endorsed the Rheumatic Fever Project, conducted by the Kansas Heart Association and the State Board of Public Health.

Report of Meeting Held May 10, 1972

The Council was called into session immediately at the conclusion of the Second House of Delegates meeting held at the Salina Hilton Inn. Dr. Kenneth L. Graham presided.

Dr. Graham welcomed the newly elected officers and councilors, and spoke briefly on some of his plans for the coming year, including the need for greater participation of the specialty societies with the Kansas Medical Society.

Drs. David E. Gray and Donald R. Pierce were reelected to a three-year term on the Editorial Board of the JOURNAL. Dr. Gray was reappointed as Editor by unanimous acclamation, with the stipulation that he continue to write editorials for the JOURNAL.

The Nominating Committee for 1973 was elected

(Continued on page 358)

THE 1972 CONVENTION GLIMPSES

Courtesy of Chet Lessenden's Camera

WRING OUT THE OLD—

Outgoing President Bill Reals presents his daughters to Tom Butcher, who appears inclined to take them, while Katy Pyle and The Masked Marvel look on.

BRING IN THE NEW

Under the observation of his wife and Archibald O. Tetzlaff, Ken Graham gives out with a laugh of which he will not have many this coming year.

THE QUEEN BEE AND HEAD DRONE

Auxiliary's Madame President, Jean Pierce, indicates a touch of relief that the year is about over while Don indicates his reaction at getting his wife back.

ON THE CAMPAIGN TRAIL

The Yoders and Travises promote their respective candidates by saying "Cheese."

"UNACCUSTOMED AS I AM—"

The Honorable Bill Roy, the 2d District's peripatetic fugitive from the delivery room, brings the word from Foggy Bottom to Windy Hills. (Non-paid Pol. Adv.)

Woman's Auxiliary

. . . Annie Goes to the State Convention

"Springtime in Salina." It sounds like a Perry Como ballad, doesn't it? If you ask Annie, the whole state convention was a sweet song. People from other parts of the country, especially those from the East, have a tendency to make fun of Kansas. Falling under the influence of TV westerns, Zane Grey and John Steinbeck, they picture anything from Indians to a desert dust bowl. What a shock they'd have had if they'd been in Salina. Gently rolling hills featuring jewel-green pastures crew-cut by last winter's cattle and waving half-grown wheat fringed with newly leafed trees surrounded the city. In town, rain-washed gardens sparkled. Flowers and shrubs turned on their finest efforts. Everywhere it was May.

Just as spring brings out the best in Mother Nature, it brought out the best in human nature. Old friends and new got together for business and fun, for even business is fun at convention. Both the Kansas Medical Society and Auxiliary convention hosts had everything set up to perfection. Accommodations for business and pleasure were well worked out. The men had their meetings at the Hilton Inn, and the women went to Marymount College. Close-by, the Salina Country Club waited, ready for luncheons and dinners. Maybe you think it isn't wonderful to walk into a beautiful dining room and just sit and be served! Of course we hope all you men feel that way about your homes, but for the three days of convention, every day was "Mother's Day" for Auxilians. No cooking, no dishes, and sometimes even flowers and favors.

Our AMA-ERF chairman, Jean Cavanaugh, set up shop in the Country Club foyer before each of the luncheons and banquets. She wasn't so dumb. You should have seen those watches and corsages sell. Why, even Annie's husband bought himself a new watch, and he already had three! Annie couldn't say anything, though, because she got one too, and she has four. A table of stationery, knick-knacks, and gift items was kept busy too. We haven't heard how much money Jean made from Salina sales, but Annie's bet her typewriter it was adequate. Just that much more for medical student loans. Help's on the way, doctor . . . keep schmiling.

Auxiliary business went well. We won't bore you with details. Our gracious and lovely national president-elect, Mrs. Robert Beckley, was with us two days. Hulda is a special sort of person, combining a down-to-earth wisdom with up-to-date ideas. We like her. She will be stressing community health, especially nutrition, and safety next year, in addition to the usual national priorities of AMA-ERF legislation, membership, and health manpower.

The Health Careers bus got a bit of fuel for its carburetor. We had the bus in good mechanical shape, but had been coming up short in funds to renovate the inside. The Kansas Medical Society voted to help us "put it on the road." So next fall you'll see Her (that's her name . . . it means Health Education Resources . . . how's about that?) rolling down the highway visiting Kansas towns. Thanks loads, it's wonderful to have you back us up.

The new LEGS legislative program is well on the way too. You'll be hearing from us, one way or another.

Jean Pierce is to be congratulated on a very successful year, starting with the new Kansas regional fall workshops and ending with two new programs well under way.

Annie finally got to see and hear the Singing Doctors too. The Sportsmen's Banquet was the usual success, as was the President's Banquet, which featured an outstanding musical group from Minneapolis called, The Swinging Ambassadors. They took us on a musical trip through history from ballads, to swing, to hard rock tunes.

All in all, it was wonderful. Even the men remarked how much they liked to see their ladies back in long dresses for evening. We like them too, and especially we like you, our husbands.

Sure did have fun.

Auxiliary Annie

Council Meetings

(Continued from page 355)

to consist, in addition to the two most recent past presidents, of the following: M. Robert Knapp, Wichita; Warren E. Meyer, Wichita; Spencer C. McCrae, Salina.

Upon a motion duly made and seconded, Mr. Jim Agin was employed as the Provisional Administrative Assistant.

The Council voted to declare members whose dues were not paid by April 1 as delinquent, and to so notify them.

Health Care Legislation

(*Editor's Note:* The following remarks by the Honorable Wilbur D. Mills, M.C., were presented at the Health Care Forum, Topeka, Kansas, on April 8, 1972.)

I very much appreciate the opportunity to meet with you this evening and discuss some of the health issues of the day. And I want to thank Doctor Roy, your distinguished representative in Congress, for making my visit with you possible. Dr. Roy has already established a well-deserved reputation in the health care field in the Congress. He has brought a candid, common-sense approach to health matters which is both refreshing and useful. He is bringing the experience of the practicing physician directly into the legislative process, and this is good. His bill on support for health maintenance organizations seems to me to be a sound approach and generally consistent with the approach the Committee on Ways and Means took in H.R. 1.

The high level of legislative activity on health matters which is taking place now is a reflection of the active period of ferment and change which permeates the health field today. This period of re-examination of priorities and methods in health is most obvious among physicians themselves. And this is a most encouraging sign. I have become convinced from my experience as a legislator over the last 33 years that legislation cannot solve all the problems in an industry as large and as complex as our health industry. I must say, though, it appears that the threat of legislation has some influence on encouraging the health professions to recognize and seek solutions to serious problems in American health care. But whatever the motivation, I am greatly pleased to see so much active consideration of these problems by the people who are involved in health care.

While the motivation for change must come largely from within the health professions, if we are to see real rather than merely paper progress, there is much that government can do to support that progress. I would like to take the major part of my time discussing in general terms what the government's role might be, but a word or two first about the present situation.

As you all know, government already plays a very substantial role in health. And you know that the debate surrounding national health insurance is not *whether* the government should become involved in health but *how much more* and in *what way*. The magnitude of the present government role can be illustrated by two simple facts. The first fact—two government programs alone, Medicare and Medicaid, are paying out more money in this fiscal year for patient care than will all of the private health insurance organizations combined. The second fact—out of a total of $75 billion in fiscal year 1971 spent for health, government at all levels spent $28.5 billion, or 38 per cent.

What additional activities are appropriate for government in meeting our present problems? Let me try to answer that in terms of what I see as possible major elements in any national health insurance legislation likely to be approved by the House of Representatives.

The first element will likely be a new program of health care for the poor. The present Medicaid program, while it has done much to improve health care for the poor, needs to be replaced with a program which will make a uniform set of benefits, at least as comprehensive as those available to the middle income groups, available to all of the poor in all areas of the country. The administration bill, as you know, meets none of these conditions.

The second element will be a program to improve the health insurance protection, both in quality and quantity, available to the great bulk of Americans in the middle income groups. The information on present health insurance indicates the spotty coverage and irrational premium setting devices which characterize our present arrangements.

I believe government can help in this area by providing the mechanism under which virtually every American family, regardless of its situation, will have the same basic coverage at about the same price. And I believe that we can do it without having to place on the federal bureaucracy the entirely impossible administrative task of managing our entire health complex, which is recommended by some.

For employed Americans and their families, we can follow the general idea of our existing Workmen's Compensation programs by requiring that all employers provide a basic set of health benefits largely at employer cost. In this way, we could avoid the serious problems inherent in the administration bill where the employer merely has to offer the insurance.

We could quite easily and appropriately extend the purposes of the unemployment compensation program to include maintenance of health insurance protection during periods of unemployment. I would, however, have employers, employees, and the government share equally in the cost—employers should not be asked to shoulder the entire burden of maintaining protection for the unemployed.

We will also need a system to assure basic benefits to the self-employed and perhaps small employ-

ers. The administration bill would attempt to rely upon risk pools to accomplish this objective, but their spokesmen admit they have not been able to find a way to do it. It may be that we will have to develop two or more nationwide options under government auspices to provide health insurance coverage to these groups on at least as favorable terms as those for employees of large firms.

With these three major elements, mandated health coverage for the employed and self-employed and their families, continuation of the coverage during periods of unemployment, and the same benefits for the poor, we will have constructed a system which can meet the goal of assuring the same basic benefits to virtually all Americans, without a complete government takeover.

And as a supplement to all of these, we will need a system for meeting catastrophic health costs. But I have become pretty well convinced that the catastrophic element of the bill must measure the catastrophe by comparing the amount of a family's medical expenses with its financial situation. That seems to me to be essential, since what is a catastrophe in one family would not be in another. The working family man with a wage of $9,000 a year can be bankrupted a lot easier than a man with an income of $100,000. An approach which would relate health costs to taxable income would seem to hold the most promise of assuring adequate protection for those who need help while avoiding spending public funds for those who do not need it.

While these are the major steps we will be considering to meet problems of inadequate insurance protection against health costs, there are also problems related to health care delivery and costs which we will need to consider. We cannot deal with the demand side of health care without looking at the supply side.

While there is not time for me to go into all of the things we might do to improve the delivery of health care, I would like to mention a few possibilities. But before I do, let me remind you that one common theme in the hearings last fall on health insurance was the need to use the payment system to encourage change in delivery. To apply an old adage, we are being asked to call the tune as the ones who pay the piper. I think we will call a few tunes, not to put the bureaucrats in charge of health, but to give support to positive forces for change in health care.

For example, we could require private insurers as well as government programs to use medical foundations to perform all utilization review functions. And we could add to that a provision setting up a medical group at the national level composed of representatives of the various medical specialties to advise local foundations about current changes in recommended diagnostic and therapeutic practices.

The Administration has recommended that third-party payments not be made for health facilities which have been built or expanded without specific approval of a health facilities planning agency. We will give this proposal serious consideration.

In conclusion, I would like to repeat what I said at the outset. The impetus for real and lasting change in our health system to meet its problems must come largely from those working within the system. The problems of rising costs, of disorganized and ineffective methods of providing health care, of increasing dependence on foreign medical graduates so desperately needed in their own countries, and other problems of which you are aware cannot be solved by government alone. Legislation can effectively support forces for change; it cannot create them. We in Congress will continue to view carefully the steps you are taking to meet known problems. We will need your thoughtful advice on how legislation can best support emerging solutions to the problems, and the capable advice of your able representatives. I hope you will give us your help freely and objectively, so that together we can work toward a health financing and delivery system which will be what all Americans deserve.

Reflux Esophagitis

(Continued from page 344)

studies at intervals, to demonstrate the efficacy of the new sphincter mechanism and, thus, prevention of gastroesophageal reflux. Nineteen patients in this group had significant pulmonary complications attributable to the reflux of peptic contents and aspiration. The relief of pulmonary symptoms, following the creation of a sphincter mechanism at the cardioesophageal junction, has been impressive.

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THE Journal OF THE Kansas Medical Society

AUGUST
1972

VOL. LXXIII
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Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

Dosage: Individualize for maximum beneficial effect. *Adults:* Tension, anxiety and psychoneurotic states, 2 to 10 mg b.i.d. to q.i.d.; alcoholism, 10 mg t.i.d. or q.i.d. in first 24 hours, then 5 mg t.i.d. or q.i.d. as needed; adjunctively in skeletal muscle spasm, 2 to 10 mg t.i.d. or q.i.d.; adjunctively in convulsive disorders, 2 to 10 mg b.i.d. to q.i.d. *Geriatric or debilitated patients:* 2 to 2½ mg, 1 or 2 times daily initially, increasing as needed and tolerated. (See Precautions.) *Children:* 1 to 2½ mg t.i.d. or q.i.d. initially, increasing as needed and tolerated (not for use under 6 months).

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Contents for August

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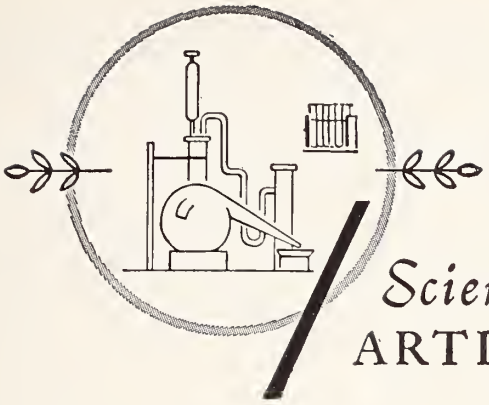

Scientific
ARTICLES

Problem Oriented Chart

Why the Problem Oriented Medical Record: One Physician's Assessment

JOHN F. BENAGE, M.D., ***Fort Scott***

WHY WOULD a physician, after eight years of private practice in obstetrics and gynecology, suddenly decide to scuttle the only system of record keeping he had ever known and take valuable time to learn and initiate a totally different type of record keeping system?

To put it mildly, the hospital record has always been my Achilles' tendon in medicine. I was so negative to it in my training years that when I was a senior resident in obstetrics and gynecology, I was honored with a trophy at the annual spring department dinner for senior residents. It was engraved, the "Delayed Dictation Award!"

When I entered practice in Fort Scott, I made every effort to live up to the honor bestowed on me at the University of Kansas Medical Center. Every month, I received a notice from our hospital stating I had to complete a certain number of charts before the following Monday, or lose staff privileges!

In September 1970, I attended the hospital staff conference in Estes Park, Colorado. One of the sessions I attended was a lecture by Dr. Lawrence Weed on problem-oriented charts. Anyone who hears Dr. Weed will be stimulated, whether or not they agree with him. However, in me, he provoked a very serious assessment of attitudes and approach to medical records. By the time of my return to Fort Scott, I had arrived at the following evaluation of our time-honored source-oriented medical record.

The medical record as I had kept it (and confident that as most practicing physicians keep it) is a totally inaccurate instrument and a complete waste of valuable time. When a physician

(a) doesn't write progress notes or writes them after the patient has been dismissed,

(b) dictates the operative report four days after the procedure or two weeks after the patient was dismissed,

(c) doesn't commit himself on the record as to the reason for particular medications, procedures, or tests,

(d) doesn't provide a complete history with recognition of all the major complaints of the patient,

(e) doesn't record all the complications the patient developed during hospitalization,

he does not have a correct reproduction of a patient's experience in the hospital, and that reduces his record to something of little value. The majority of lawsuits against physicians, where the reason for suit is questionable, are won by the plaintiff because the record did not reflect the care supposedly given.

Herein lies the basic reason for my deep distaste for the source-oriented record. It is full of only half-truths which are of little value during hospitalization, and of virtually no value following dismissal. It is a cumbersome instrument requiring considerable time to try and sift information: All laboratory values are grouped together, all x-rays together; nurses' notes (if any) are separate from physician's notes (if any) and rarely are all these summarized in the chart to identify specific problems before the patient goes home.

Much has been written about the differences between the older, time-honored, source-oriented medical record and the new problem-oriented type medical record. I do not wish to expound on any of these, but by briefly listing salient points, I am likewise giving you my reasons for converting to this type of record system.

The concept of a problem list on the front of the chart listing all the problems of the patient provides a table of contents to the medical history of that patient for all involved in his care to see and know. This is vital information for the physician in charge of the patient, for the physician covering the physician in charge of the patient, for the nurses on the floor, for radiologists or inhalation therapists, etc. The chart utilizes patient care notes, whereby nurses and physicians write progress notes on the same page. The notes are identified by numbers and related to the problem list. No longer does the nurse or physician write superfluous and meaningless tidbits such as "good day," "up and about," "had good BM," etc.

The patient care notes are written in the classic problem-oriented fashion, the so-called S-O-A-P method:

*S*ubjective—the patient's complaints

*O*bjective—physical signs or laboratory values and results

*A*ppraisal—your impression as to etiology

*P*lan—what to do about it

Such an outlined note may at first glance seem rather juvenile or "too basic" for the average practicing physician to adhere to. If all physicians were honest with themselves and gave reasons for their actions in patient care so all could see and know, then this regimented type note would not be necessary. The patient care note requires thought by both nurses and physicians, and prevents the routine rote mechanism of handling patients the same way every time without justifying your reasons on paper.

For the past one and one-half years, I have been greatly involved in learning and applying the principles of the problem-oriented system of record keeping. During this time, I have worked with Dr. Richard Easton of Coffeyville on a Kansas Regional Medical Program project related to familiarizing hospital staffs and personnel in southeastern Kansas about computerized medical histories, the problem list, and problem-oriented records. In Fort Scott, we now have one floor of nursing personnel oriented to this type record. On this floor my charts are pure problem-oriented; namely, they contain a problem list, patient care notes (progress notes written by nurses and physicians together), and patient care notes written in the characteristic S-O-A-P fashion. There are no nurses' notes such as most physicians and nurses are familiar with. We have installed an IBM magnetic tape selectric typewriter (MTST) with a programmed medical history tape for detailed personal histories. I have personally been using these on a trial basis for the past five months and they leave little doubt in my mind that they are considerably more complete than any history taken by a moderately busy practicing physician.

This system, which is far superior to our present system of record keeping, will be slow to be accepted. Physicians are very busy people—most of them because they are trying to care for too many people; some of them because they want to make more money. We physicians have very independent personalities. We become very routine in our mannerisms and change our routines quite reluctantly. There is at least a small amount of paranoia in the majority of us. Today, there is a growing negativistic attitude of many of us toward the various changes being suggested by our peers—whether that be the American Medical Association, federal or state governments, or our own state medical societies. With all these factors, it is no small wonder that the problem-oriented approach is hard to come by for the average practicing physician. But, after all, what is our purpose as physicians? Is it to become experts on rationalizing about our own personal inadequacies in delivering health care, or is it to probe, recognize, and develop methods by which we can provide ever improving health care to fellow human beings?

In conclusion, I would like to state that I believe the problem-oriented record will be the system of prominence within the next decade. It has the potential, when combined with programmed or computerized patient histories, to vastly upgrade patient care by:

(a) increasing the awareness of all the patient's problems,

(b) involving the RN so as to utilize her knowledge more completely for patient care,

(c) providing a teaching instrument—each individual record—whereby practicing physicians and nurses can discuss cases and problems more readily,

(d) being a uniform record system whereby medical audit can function efficiently,

(e) providing a complete sound record so as to significantly affect the liability pressures now present with all of us.

Gastric Ulcer Perforated Into Pericardium

A Unique Complication of Thal's Esophagogastroplasty

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Case Report

A 44-YEAR-OLD MALE, psychiatric patient with long-standing history of achalasia, reflux esophagitis, and stricture of the lower esophagus was referred to the Surgical Service of the Topeka VA Hospital on June 25, 1971. The past history indicated a side-to-side esophago-gastrostomy performed transthoracically in 1953, because of obstruction related to the achalasia *(Figure 1)*. During the following years, frequent dilatations of the lower esophagus had been required. Chronic acid reflux esophagitis led to recurrent obstructions of the esophagus.

A Thal's esophago-gastric fundus plication with vagotomy-pyloroplasty was performed in 1968 *(Figure 2)*. The patient seemed to improve after this procedure. However, esophageal reflux continued with dysphagia and left chest pain.

In June 1971, radiological studies showed an apparent left diaphragmatic hernia with penetration of the splenic flexure of the colon into the chest cavity. After preparation on June 29, general endotracheal anesthesia was induced. The patient was placed in the left lateral thoracotomy position. At this point cardiac arrhythmia, hypotension, and cyanosis developed, requiring cancellation of the surgery. Observation during the next 48 hours ruled out myocardial infarction, the electrocardiographic changes being attributed to myocardial ischemia and diaphragmatic hernia. The condition stabilized by July 9, when left chest pain radiating to the left occurred. An electrocardiogram now indicated myocardial infarction with pericarditis. Blood pressure was 98/60, pulse rate up to 120. Treatment for myocardial infarction, including heparin-coumadin anticoagulation, was instituted. The patient's condition remained poor, with tachycardia, narrow pulse pressure from 90/60, unrelenting left chest pain, and cardiovascular failure. The patient expired on July 12. Autopsy revealed a huge gastric fundal ulcer which had perforated into the posterior pericardium *(Figure 3-4)*. Approximately 100 cc of fluid and fibrinous exudate were present in the pericardial cavity along with necrotic changes due to acid digestion of pericardium and epicardium *(Figure 5)*. Section of the ulcer showed attempted sealing of the perforation by fibrin as well as old sclerosed tissue. The pathologist's interpretation was that the peptic ulcer had progressively dissected through the pericardium, leading to frank perforation and flooding of the pericardial cavity by gastric fluid. Acute and chronic pericarditis and, most probably, acute cardial tamponade had resulted, leading to death.

Spontaneous perforation of stomach into pericardium is almost unheard of in the surgical literature. Our report concerns spontaneous perforation of Thal's gastric fundal pouch into the pericardium followed by pericarditis, cardiac tamponade, and death.

Figure 1

Topeka Veterans Administration Hospital, Surgical Service.

Figure 2

Figure 3

Discussion

Nineteen cases of esophago-pericardial fistulas were collected and reported by F. A. Laubscher in 1970.[1] Five of these originated in esophageal peptic ulcers. Other causes of esophago-pericardial fistulas were dissecting foreign bodies, malignant tumors, and diverticuli.

Esophago-aortic fistulas are more common, and about 100 were listed by Sloop, *et al.*[2] in 1967. We have been unable to find reports of gastropericardial perforation. We recognize in our case, however, the partial iatrogenic implication of the Thal procedure performed in 1968 with persistent acid reflux.

The surgical treatment of serrate lower esophageal stenosis due to reflux esophagitis remains a true challenge to the surgeon. The problem of treatment of reflux esophagitis and related complications is totally different whether esophageal stricture has already developed or not.

In cases where no direct esophageal surgery is needed, as for instance in the usual case of hiatus hernia with reflux, a number of procedures have been described which provide prevention of reflux, therefore favoring healing of the inflamed esophagus and stricture prevention.

Among the most significant such operations developed and enunciated in this country the foremost work is by Holt and Large,[3] who performed vagotomy, hemigastrectomy, and Roux-en-y gastro-jejunostomy for dependent drainage of stomach contents.

Cenni, *et al.*[4] recognizing the problem of post-gastrectomy bile reflux esophagitis, utilized the same Roux-en-y drainage procedure, with vagotomy when necessary, with good results. Likewise vagotomy, hemigastrectomy with Roux-en-y gastro-jejunostomy has been repeatedly used by Cenni and this author in cases of hiatal hernia with acid reflux, leaving undisturbed the hiatal defect and lower esophagus. We have had persistently good recovery with this procedure.

Sifers, *et al.*[5] perform a subdiaphragmatic fundal plication around the esophagus with secondary fundopexis to aortic and pancreatic fascia. However, when direct surgery over the stenosed or obstructed esophagus is required, more radical surgery has to be used. Apart from the original Wangensteen[6] esophagogastric resection with end-to-end anastomosis (which did not prevent acid reflux), and the side-to-side esophagogastric bypass above the site of stricture, two procedures have stood as a true choice to the operating surgeon: Merendino's and Thal's. Merendino, *et al.*[7] interposed an isoperistaltic segment of upper jejunum to bridge the resected esophagogastric segment. His remains one of the best pro-

Figure 4

Figure 5

cedures for treatment of lower esophageal strictures and prevention of gastric reflux. Thal *et al.*[8] described their ingenious method of utilizing a gastric fundal patch over the split-open lower esophagus, to achieve both adequate lumen formation and valve prevention of reflux. Thal subsequently advocated this procedure as a unitarian approach to all problems of reflux esophagitis, whether complicated by stricture or not.

However, more recently, Clarke *et al.*[9] reported a high incidence of esophageal reflux following the Thal fundic procedure. They were able to correct this by a Nissen fundal plication around the esophagus and above the Thal patch. They believe that the added vagotomy-drainage procedure done at the same time as the Thal procedure did not prevent the corrosive effects of reflux esophagitis.

Wise, *et al.*[10] found a lesser incidence of reflux and clinical failure following the Thal procedure (four out of fourteen cases) and they also could correct this complication with the Nissen plication around the lower esophagus. Seven out of 14 patients developed some degree of esophageal stricture following the Thal operation. Vagotomy and pyloroplasty, or other drainage procedure, are recommended by these authors.

Conclusion

The unique case of a gastric ulcer perforated into the pericardium in a patient who had received Thal's fundic patch procedure, leading to his death, has been presented.

The most significant methods of surgical treatment of acid or bile reflux esophagitis, with or without stricture formation, were reviewed.

Although we have tried the Thal procedure of fundic patch in cases of severe esophageal stenosis, we feel hesitant to accept his concept of using his procedure as a "unified approach" to the solution of all problems of reflux esophagitis. In fact, we remain highly selective in choosing the most appropriate procedure in each case.

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Clinical Cardiology

Treatment of Cardiogenic Shock I

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ALTHOUGH the treatment of cardiac arrhythmias following a myocardial infarction has decreased in-hospital mortality, cardiogenic shock remains a major cause of death. The mortality rate of cardiogenic shock is still in the range of 75-80 per cent. It is estimated that over 100,000 individuals die yearly in the United States with this syndrome. The clinical profile of the patient with cardiogenic shock is familiar. At some point after sustaining a heart attack, the blood pressure starts to fall and is usually no greater than 80 mm Hg systolic. A tachycardia of 120-140 beats per minute is quite usual. The skin color is a dusky cyanotic gray and the patient is markedly diaphoretic. Urine output falls and the patient's sensorium becomes clouded. He will often be barely arousable, or may be quite irrational. Terminally, ventricular tachyarrhythmias or heart block may occur.

If any one form of therapy had proved to be successful, there would be little controversy concerning the proper medical therapy for this condition. Since the mortality is so high, there have been many forms of therapy advocated. Since there is no uniform agreement concerning therapy, the following approach is one which the author accepts as a generally reasonable one. It is axiomatic that therapy must be individualized for each patient, and that no patient should receive a predetermined regimen.

The principles of therapy for cardiogenic shock follow from the pathophysiology of this condition. There is increasing evidence that the major factor leading to cardiogenic shock is an inability of the left ventricle to perform adequately as an effective pump. In almost all cases, cardiac output is markedly diminished. Similarly, the hypotension, which is a hallmark of this syndrome, is in large part a consequence of low cardiac output. Since a critical pressure is necessary to maintain coronary filling, the hypotension has deleterious effects upon coronary filling, and this in turn leads to further deterioration in the ability of the heart to support the circulation.

The two goals of therapy for this condition are: (1) To increase the cardiac output, and (2) To raise systemic blood pressure. Both of these goals could be achieved if the left ventricle were helped sufficiently to augment its contractility.

General Considerations

Since cardiogenic shock has such a dreadful prognosis, any patient with this syndrome should be treated in a specialized facility capable of handling the intricate problems that arise. Adequate bedside and central nursing station electrocardiographic monitoring should be available. An intravenous line capable of measuring central venous pressure should be present, and fluids and medication may be administered through it. Although it is desirable under certain circumstances to be able to directly record arterial pressure through the use of a strain gauge and pressure transducer, this latter intervention is not absolutely essential.

The measurement of central venous pressure may be important in unmasking hypovolemia as a contributory factor to the shock. With the widespread use of diuretics in cardiac patients, it is not unusual for the patient who sustains a myocardial infarction to have the problems of hypovolemia added to those of pump failure. Although it is well recognized that the central venous pressure may be totally normal, even if the patient is in pulmonary edema, knowledge of the central venous pressure does help management. If the central venous pressure is low or normal, and if the patient is not in gross left sided congestive heart failure with rales, dyspnea and roentgenographic evidence of pulmonary edema, judicious fluid therapy may be extremely valuable in reversing the state of circulatory failure. By taking advantage of the fact that as left ventricular end diastolic pressure and volume increase, so will left ventricular work and stroke output, a trial of 250 ml of isotonic saline or low molecular weight dextran may be tried. If this improves the circulatory state, then another 250 ml may be given. At times, a simple therapeutic maneuver such as fluid administration may be of great help in relieving many of the manifestations of this syndrome.

If central venous pressure is elevated in the absence of cor pulmonale, there is generally little chance that fluid administration will be helpful, and the danger of causing pulmonary edema increases.

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Other general principles, such as oxygen administration and adequate pain relief, will not be commented upon in this review other than to mention them. Pain, such as that which may occur with a myocardial infarction, may often lead to vagal reflexes which potentiate hypotension. Sufficient analgesia should be given to alleviate pain completely.

Digitalis Glycosides

There is considerable controversy concerning the role of digitalis glycosides in the syndrome of cardiogenic shock. The argument usually cited by physicians who are reluctant to utilize digitalis, is the recognized potential of digitalis to cause ventricular arrhythmias. More recently, it has been shown that any intervention which increases the velocity of myocardial contraction also increases myocardial oxygen consumption. One of the actions of digitalis is to raise the velocity of contraction and, therefore, it may raise myocardial oxygen consumption. It has been demonstrated that areas of myocardium which are marginally oxygenated following an occlusion of a coronary artery, may become necrotic instead of ischemic, if myocardial oxygen consumption is augmented. However, if one accepts the thesis that the primary abnormality in cardiogenic shock is a marked depression of left ventricular contractility, then digitalis therapy becomes a very rational means of trying to restore circulatory integrity. Unfortunately, a controlled study of digitalis therapy in cardiogenic shock is still not available.

It is the author's practice to administer digitalis early in the course of cardiogenic shock, if the patient is not already taking this medication. The onset of action and peak effect of intravenous digoxin are such as to make it a perfectly reasonable drug to use. Between 1.0 and 1.5 mg digoxin is given intravenously in approximately a two-hour period in doses of 0.25 mg every fifteen or twenty minutes.

It should be noted that pulmonary venous congestion or other signs of left heart failure need not be present in a patient with cardiogenic shock. The author feels, nonetheless, that digitalis plays a role in the therapy of the patient in cardiogenic shock. It should be recognized, however, that this form of therapy is not agreed upon uniformly.

Vasopressors

The most easily recognizable feature of cardiogenic shock is hypotension. A variety of agents are available to raise arterial blood pressure. The sympathomimetic amines have received considerable use. These drugs have been classified into alpha or beta stimulatory agents. Alpha adrenergic drugs act primarily on the peripheral arterioles and raise blood pressure by increasing peripheral resistance. Included in this group are methoxamine (Vasoxyl) and phenylephrine (Neosynephrine). A second category of drug not only stimulates alpha adrenergic receptors in the peripheral arterioles but also stimulates beta adrenergic receptors in the myocardium. Metaraminol (Aramine), nor-epinephrine (Levophed), and epinephrine are examples of this type of agent. An example of a sympathomimetic amine which has only beta stimulating effects is isoproterenol (Isuprel). Since isoproterenol acts as a peripheral vasodilator, it does not appropriately fall into the category of a vasopressor, although it is a sympathomimetic amine.

Although raising the blood pressure is generally considered an appropriate goal in the treatment of a patient in cardiogenic shock, the issue is not quite that simple. Since most filling of the coronary arteries occurs in diastole, the coronary arteries do require a certain level of pressure in the central aorta in order to fill. Myocardial function is dependent upon adequate coronary bloodflow and will deteriorate in the presence of inadequate perfusion pressure.

It has been shown, however, that drugs which act only on the peripheral arterioles, thereby raising blood pressure by elevating peripheral vascular resistance, may have a deleterious effect upon patients in cardiogenic shock. If left ventricular function is sufficiently impaired to place a patient into cardiogenic shock, increasing the resistance against which the left ventricle must pump may further decrease cardiac output.

For this reason, drugs which act solely on the peripheral vasculature, such as methoxamine or phenylephrine, have little or no role in the therapy of cardiogenic shock.

Agents which act both on the beta receptors of the myocardium and the alpha receptors of the periphery have been used most extensively. It is wise to use as little of these agents as are necessary to maintain an adequate perfusion pressure, and it is also advisable to give these agents by intravenous drip rather than intramuscularly. By so doing, blood pressure can be titrated more precisely. It is not necessary for the blood pressure to be brought to normal levels. A systolic blood pressure of 90-100 mm Hg is usually adequate. It is the author's practice to place 50 mg of metaraminol in 500 ml of 5% dextrose in water. This is infused at a rate sufficient to elevate blood pressure the desired amount.

Nor-epinephrine (Levophed) is another sympathomimetic amine which has potent effects upon both the periphery and the central circulation. Although blood pressure can generally be raised by an intravenous drip of nor-epinephrine, experience indicates that relatively few patients survive if it becomes necessary to use this drug in order to sustain blood pressure.

Glucagon

Glucagon, a hormone which has been shown to raise blood sugar, has also been utilized recently in patients with cardiogenic shock. Although its mechanism of action is not known precisely, it does have the property of increasing cardiac contractility, possibly by augmenting the synthesis of cyclic AMP. Initial studies of this agent in the animal laboratory and in the human cardiac catheterization laboratory led to some enthusiasm for its use in patients with myocardial infarction and shock. Other than for some anecdotal reports of its efficacy, this agent has generally been disappointing in the treatment of this condition, and has generally been abandoned as a useful therapeutic agent.

Treatment of Cardiogenic Shock II

Assisted Circulation

As INDICATED in Part I of this review, the major abnormality in cardiogenic shock is failure of the left ventricle as an effective pump. To this end considerable effort has been expended in the development of cardiac assist devices to help the left ventricle which has been damaged as a consequence of a myocardial infarction.

Many lessons concerning prolonged assisted circulation were learned from surgical procedures utilizing extracorporeal circulation. Although the heart-lung machine may take over completely the functions of oxygenation and pumping of blood, there are many limitations to this technique for patients in cardiogenic shock. The need for a thoracotomy in a critically ill patient virtually rules out any potential efficacy of this approach. In addition, the problems of hemolysis, plasma protein changes, clotting, infection, and postperfusion lung make prolonged extracorporeal circulatory techniques unfeasible for patients with cardiogenic shock.

Modifications of total extracorporeal circulatory assist have been utilized as temporary measures to help support a failing circulation. *Veno-arterial* pumping is one of these modifications. With this method, blood is withdrawn through a cannula introduced into the central venous system from the femoral vein. Blood is pumped into the arterial system from the femoral vein. If the venous blood is passed through an oxygenator, the patient is on partial heart-lung bypass for all practical purposes. If no oxygenator is utilized, the procedure is much simpler, but anticoagulant drugs still are necessary to prevent clotting within the system. It has been demonstrated that the lower body and extremities can tolerate prolonged periods of perfusion with venous blood.

Left Heart Bypass

This method of assisted circulation removes oxygenated blood from the left atrium and returns it to the systemic circulation. By so doing, flow to the left ventricle is diminished by the amount removed from the left atrium. The pump is in series with the right ventricle and lungs but in parallel with the left ventricle. By reducing cardiac inflow, the distended left ventricle is given some degree of rest. It is likely that myocardial oxygen consumption is diminished as end diastolic ventricular volume and radius are decreased. Left heart bypass may be accomplished with or without thoracotomy. In the context of a patient in cardiogenic shock, a method requiring thoracotomy is obviously not feasible. As an adjunct to postoperative care, this method has been utilized with some success.

A method of left heart bypass which does not require a thoracotomy has been developed. A transseptal cannula introduced into the external jugular vein is passed across the atrial septum into the left atrium. Although this method of cardiac assist was reported over ten years ago, there is still no clinical trial demonstrating its efficacy for patients after a myocardial infarction.

Although any of the above mentioned forms of assisted circulation do reduce the flow work of the left ventricle, it has been demonstrated that myocardial oxygen consumption is much more closely related to pressure work. A method of assisted circulation that reduced the pressure work of the left ventricle would theoretically be of considerable benefit in reducing myocardial oxygen requirements.

Arterio-arterial pumping or counterpulsation is a form of assisted circulation that can reduce the systolic pressure against which the left ventricle must pump. In addition, counterpulsation raises aortic diastolic pressure, thereby increasing coronary bloodflow. In 1961 Harken *et al.* reported on a counterpulsation device which involved cannulation of the femoral arteries. By synchronization with the electrocardiogram, the pump aspirated blood from the femoral arteries during cardiac systole and returned blood to the central circulation during cardiac diastole. Considerable diastolic augmentation was achieved. Other investigators using synchronized counterpulsation in dogs found that myocardial oxygen consumption decreased by over 20 per cent, and coronary bloodflow was increased by 50 per cent.

A variation upon the method of counterpulsation is that produced by the use of an intra-aortic balloon. This technique involves the inflation of an intra-aortic balloon at the onset of diastole and its deflation at the onset of systole. The advantages of this method are that it is totally intravascular and no blood is handled outside the body. There is less

hemolysis in this technique than in counterpulsation devices, which depend upon aspiration and return of blood to the vascular system for their hemodynamic effects. Heparin must be used, however, because of clotting of blood around the balloon. Rupture of the balloon with introduction of gas emboli into the vascular system is a potential hazard. Damage to the aortic wall by overdistention of the balloon may occur. Although an arteriotomy must be made for introduction of the balloon into the vascular system, there is no need for the diversion of blood through a conduit of foreign material.

Because of the desirability of having a cardiac assist device which is completely non-invasive, counterpulsation utilizing external body compression has been a goal of several groups of investigators. Such a device could be applied quickly, be free of any extracorporeal handling of blood, have no need for anticoagulants, and would not involve any operative intervention. Because of these features, it might be available to a patient earlier in the course of cardiogenic shock before prolonged hypoperfusion of vital organs made survival unlikely. Counterpulsation of the extremities involves displacement of blood retrograde into the central aorta during diastole, and increasing the capacity of the arterial system during systole, so as to draw blood from the aorta.

Dennis and his associates utilized a pressure sleeve on the hindlimbs of dogs and applied synchronous counterpulsation. Osborn utilized a half-body pressure suit, but this was found to be uncomfortable when applied to normal volunteers. Keith found similar results when human volunteers were utilized. Soroff and his associates have also evaluated external pressure suits with and without simultaneous external cardiac massage. The combination of external assist, plus external cardiac massage, was more successful in resuscitating dogs who were in ventricular fibrillation than was external assist alone.

In 1968 a series of physiologic studies leading to the development of an external cardiac assist device, The Sequenced Pulsator, was initiated by the author and several of his colleagues. The rationale of sequenced pulsation in contrast to nonsequenced external pulsation is based on theoretical considerations underlying the effect of externally applied pressure to varying sized vessels in the extremity. Large vessels with a small wall thickness to lumen ratio more readily collapse in response to externally applied pressure than do smaller vessels, which have a large wall thickness to lumen ratio. A uniformly applied external pressure to an extremity during diastole would, therefore, be anticipated to collapse the larger, proximal vessels first, thereby impeding return of blood to the central aorta.

The sequenced pulsator consists of arm and leg sections which are divided into multiple zones, each of which may be individually and separately activated to externally compress the enclosed body tissue. Activation is accomplished by inflating a chamber in each zone with compressed air. Flexible hoses connect the pressure enclosures for the arms and legs to the pressure and timing controller. The electrocardiographic signal from the patient directs the sequenced inflation of the zones through a series of solenoid valves. At the onset of the QRS complex, all pressure is simultaneously evacuated from the extremity cuffs. With such a mode, the heart will never pump against a pressure wave produced by the assist device. The onset of cuff inflation can be set manually according to the length of cardiac systole. At the onset of cardiac diastole, the sequenced pressure inflation is begun. By inflating the cuffs at the beginning of diastole, blood is returned to the central circulation with a consequent rise in central aortic pressure. When the ventricle contracts, there is diminished resistance in the periphery due to the previous emptying of arterial blood into the central circulation during the previous diastole. Sequenced pulsation has a milking effect upon the arterial and venous beds, as pressure is applied sequentially from more distal to proximal sites. Although the sequenced pulsator has not yet been utilized in the therapy of patients in cardiogenic shock, the preliminary laboratory results indicate that external sequenced pulsation can augment cardiac output and aortic diastolic pressure.

Circulatory assist devices have the combined aim of decreasing left ventricular work and also of increasing coronary bloodflow. By so doing, it is hoped that a severely damaged left ventricle may be able to compensate and take over from the support device. Since cardiogenic shock is likely to be self-perpetuating once prolonged hypoperfusion of vital organs occurs, earlier application of assist devices may help certain patients in cardiogenic shock. It must be recognized, however, that even with the early application of an assist device, ischemic areas of myocardium may progress to the stage of necrosis. Acute revascularization of the myocardium with a saphenous vein bypass graft may be helpful and necessary in selected cases. The role of the circulatory assist device in these instances will be to stabilize the patient while diagnostic studies, such as selective coronary arteriography, are performed. The success of this approach will have to be assessed as experience with saphenous vein bypass grafting increases, and the long range prognosis of the grafts becomes clearer.

Student
THESIS

A Study of Etiological Variables in Palatolabial Malformations

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Introduction

As with any scientific investigation of congenital anomalies, the search for etiological factors in causation remains important for that study. Numerous investigations in the past have lent themselves to epidemiological considerations of cleft lip and cleft palate—and particularly the sex differences encountered; racial variations; associated malformations; effects of maternal age and parity, incidence, and ex-sex-modified multifactoral inheritance.[1]

A clear-cut etiological pattern for cleft deformities remains obscure. Other factors of significance include genetic variables, drugs, radiation, dietary influences, mechanical obstruction in utero, and maternal illness during pregnancy. Recent evidence tends to favor the hypothesis that palatolabial defects may be due to sex-modified multifactoral inheritance!

The present investigation was made to evaluate the significance of sex incidence, racial variation, effects of maternal age and parity, associated anomalies, birth rank and its association with cleft occurrence, and the incidence of familial clefts in patients with palatolabial deformities encountered in the cleft lip and palate population seen at the Kansas University Medical Center.

Method and Materials

A statistical survey of 266 patients with cleft defects admitted to the University of Kansas Medical Center between January 1, 1965 and December 31, 1970 was made. Information was obtained primarily from the hospital chart regarding the sex of the patient, race or ethnic group, extent of the patient's cleft, associated malformations, and maternal age at the time of the patient's birth.

The names and addresses of each of the 266 patients reported above were recorded and to each was sent a form questionnaire *(Appendix)*.

A total of 170 letters (64%) were returned. The information from each questionnaire was tabulated and compiled into categories representing birth rank in each cleft defect, and the total number of relatives affected with cleft lip/palate, according to the type of defect reported in the relative and that observed in the patient.

Frequency by Extent of Cleft and Sex of Patient

Fogh-Anderson[2] was the first to categorize cleft deformities into two clinically distinct groups: isolated cleft palate (CP) with female preponderance, and cleft lip with or without cleft palate (CL ± CP) showing a male excess. Mazaheri,[3] using Veau's classification, confirmed these findings by showing that for isolated cleft palate the female to male (F/M) ratio was 1.35:1, whereas for CL + CP the F/M ratio was 0.5:1. Similar ratios were found by others.[4, 5] Knox and Braithwaite[6] extended these findings and showed that in CP the sex ratios were reversed if one categorized them according to the extent of clefting; *i.e.,* complete post-alveolar clefts, F/M was 2.1:1; submucous, soft palate, soft palate and minor hard palate clefts, F/M was 0.94:1. Mes-

* This is one of a group of theses written by fourth year students at the University of Kansas School of Medicine, selected for publication by the Editorial Board from a group judged to be the best by the faculty at the school.

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TABLE I

SEX AND EXTENT OF CLEFTS ENCOUNTERED IN PRESENT STUDY, AS COMPARED WITH PREVIOUS SURVEYS

	Mazaheri			*Fraser*			*Gilmore/ Hofman*			*Total*			*Present Study*		
Cleft Group	M	F	F/M	M	F	F/M	M	F	F/M	M	F	F/M	M	F	F/M
Cleft lip	19	17	0.9	61	32	0.53	369	203	0.56	449	252	0.56	21	8	.38
Cleft palate ...	103	139	1.35	94	117	1.25	296	345	1.17	493	601	1.22	37	47	1.27
Complete ..	—	—	—	—	—	—	—	—	—	—	—	—	18	33	1.83
Partial	—	—	—	—	—	—	—	—	—	—	—	—	19	14	.73
Cleft lip and cleft palate	267	126	0.47	103	49	0.47	628	313	0.5	998	448	0.48	103	50	.48

kin *et al.*,[7] pursued in detail the sex severity relationships in clefts of all types and concluded that, independent of cleft type, an affected female appears to have a greater likelihood of demonstrating a complete cleft than does her male counterpart.

Table I lists the sex and extent of clefts encountered in the present study in comparison with previous surveys. CL, CP, CL + CP comprised 10.9 per cent, 31.6 per cent and 57.5 per cent of the 266 cases respectively. In the CL + CP and CL groups there was noted a marked male preponderance, and in the isolated cleft palate group females dominated males by an overall ratio of 1.27:1. These findings are in agreement with those previously quoted.[3–5]

A marked disparity in sex ratios was noted in the sex-severity relationships of cleft palate with partial clefts of the palate showing a slight male excess (F/M = .73), and complete cleft palates showing marked female preponderance (F/M = 1.83). Thus, an almost complete sex reversal is noted. These findings are in agreement with those observed by Knox and Braithwaite[6] and Meskin *et al.*[7]

Distribution by Race

Racial variations encountered in cleft deformities seem to favor a higher incidence of clefts in white populations as compared to non-whites. Sesgin and Stark[8] found a low incidence of cleft lip and cleft palate in New York City (1:1289), and accounted for their findings with that city's relatively high percentage of Negroes. Altemus[9] showed that the incidence of cleft defects in North American Negroes is markedly lower than the population at large. Ivy[10] studied the incidence of cleft defects in Philadelphia County, Pennsylvania with an approximately 36 per cent Negro population (as compared with the state's 10% non-whites). The state exclusive of Philadelphia County is 4.6% non-white. Ivy found a striking difference in the incidence of cleft malformations, *i.e.,* 1:890 in the state as a whole, as opposed to 1:1211 in Philadelphia County alone. He concluded that cleft lip-cleft palate deformity occurs about one-fifth as frequently in non-white as in white children. Carter[11] reported that the ratio of the incidence of these malformations in American Negroes versus American and European Whites and Japanese is approximately 1.5:8. Other geographic studies on cleft incidences support these findings.[12–14]

Conway and Wagner[15] studied the incidence of cleft deformities in white, non-white, and Puerto Rican ethnic groups. They listed them according to rates per 1,000 live births. Their results showed that cleft lip or palate defects, or both, occur twice as frequently in whites as in non-whites, and that the

TABLE II

CLEFT DEFECTS BY ETHNIC GROUPS

Ethnic Group	*Reporting Clefts*	*Per Cent*	*Ratio of Cleft to Total Live Births*
Caucasian	1740	98.9	1:960
Indian	8	.45	1:1265
Mixed	5	.30	1:296
Negro	6	.35	1:5607
Oriental	1	——	——

TABLE III

PERCENTAGE OF CLEFT PATIENTS BY ETHNIC GROUPS

Ethnic Groups	*CL*	*CP*	*CL + CP*	*Total*	*Per Cent*
Caucasian	28	81	149	258	97.0
Mixed	—	1	2	3	1.1
Negro	1	2	2	5	1.9
Total	29	84	153	266	100.0

incidence of these malformations in Puerto Ricans is usually not as great as in whites. It is greater in Negroes. They also noted that this disparity between frequency of occurrences of cleft anomalies in the ethnic groups is not apparent in other malformations, with the exception of anencephalus. By comparing the ratio of cleft defects to total live births per race or ethnic group, Gilmore and Hofman,[5] in their study of 1,760 cases of cleft malformations, showed that the highest incidence occurred in mixed races *(Table II)*.

Table III shows the percentage breakdown of cleft patients by ethnic groups in this study. The Caucasian percentage of 97 per cent probably reflects the great predominance of Caucasians in the Midwest population, and therefore those patients seen at the University Hospital. The differences noted between mixed (1.1%) and Negro (1.9%) patients is in accord with data accumulated by Gilmore and Hofman,[5] although the total percentages are slightly higher. The distribution of cleft types is proportionate to that of the cleft population at large, but the paucity of larger figures in the non-white groups leaves conclusions of this sort unreliable. It is interesting to note that out of eight total non-white cleft patients, seven were males. The eighth patient was a Negro female with the combined cleft defect.

Associated Malformations

MacMahon and McKeown[16] studied 285 newborns with cleft defects and noted associated malformations in 15.8 per cent. Subdivided into anatomical categories, this represented CL 9.1 per cent, CP 14.9 per cent, CL + CP 21 per cent. The most frequent malformations encountered in order of decreasing incidence included congenital heart disease alone (5:25), congenital heart disease with syndactyly or polydactyly (4:25), anencephalus (3:25), microcephalus (3:25), spina bifida (2:25), mongolism (2:25), exomphalos (2:25), micrognathia (2:25), and malformation of the tongue (2:25). Fraser and Calnon,[4] in their study of 456 operative cases of cleft defects, found that approximately 7 per cent had associated anomalies, the majority of which occurred in the isolated cleft palate group, the most frequent being the Pierre Robin syndrome (19:28). Knox and Braithwaite,[6] in a series of 574 cases of cleft defects, listed proportions with associated defects as CL 2.8 per cent, CL + CP 7.3 per cent, CP 12.2 per cent, and an overall rate of 7.5 per cent. Finding disparity in their results, they concluded that:

> There is a strong suggestion of the existence of a labile determining factor and of heterogeneity of etiology between some cases of cleft lip and other deformities. The other much quoted suggestion of heterogeneity is mainly based upon the sex ratios of the different malformations and suggests that isolated cleft palate is etiologically distinct.

Conway and Wagner[15] investigated the malformations most commonly associated with cleft defects in a series of 1,457 patients, 256 of whom displayed associated anomalies. They concluded that cleft palate was the prime target for multiple anomalies, and that for this reason CP and CL + CP might represent two genetic variants. A summary of these various studies is presented in *Table IV*.

The occurrence of additional anomalies in the cleft patients in this series is summarized in *Table V*. A total of 48 patients (18%) demonstrated 58 additional anomalies. Comparing the total number of patients in each cleft group showing malformations to the overall number of patients in each group, this represented 3.5 per cent (1:29) of the cleft lip group showing other malformations; 39.3 per cent (33:84) of the isolated cleft palate group, and 9.2 per cent of the combined defect group. These results are comparable with those previously recorded, with the exception that the cleft palate group represented 69 per cent of the total malformations seen. This discrepancy can probably be explained by the fact that this study constitutes a combination of operative and birth series, and that a relatively large number of these patients (mostly of the cleft palate

TABLE IV

THE INCIDENCE OF ASSOCIATED MALFORMATIONS IN PATIENTS WITH CLEFT DEFECTS

Extent of Cleft	*MacMahon and McKeown (1953)*	*Gilmore and Hofman (1966)*	*Fraser and Calnon (1960)*	*Knox and Braithwaite (1962)*	*Conway and Wagner (1965)*	*Average Per Cent*
CL	9.1	3.49	1.7	2.8	10.0	5.4
CP	14.9	13.42	13.3	7.3	16.0	12.9
CL + CP	21.0	6.48	1.9	12.2	27.0	13.7
Overall per cent	15.8	7.75	7.0	7.5	18.0	11.2

TABLE V

ASSOCIATED MALFORMATIONS IN PATIENTS WITH PALATOLABIAL DEFECTS, KUMC 1965-70*

Anomaly	*Cleft Lip* M	F	*Cleft Palate* M	F	*Cleft Lip and Palate* M	F	*Total* M	F	*Combined Total*
Pierre Robin Synd.			6	4			6	4	10
Heart Defects			2	3	2		4	3	7
Hypospadias			1		3		4		4
Inguinal Hernia	1				2	1	3	1	4
Talipes			1	1	1		2	1	3
Dislocated Hip(s)			1	1	1		2	1	3
Hypertelorism			1	2			1	2	3
Craniostenosis			1	2			1	2	3
Klippel Feil Synd.			1	2			1	2	3
Microcephaly				1	1		1	1	2
Pyloric Stenosis					2		2		2
Megacolon				1				1	1
Cryptorchidism			1				1		1
Hiatus Hernia				1				1	1
Acrocephalo Syndactylism				1				1	1
Spina Bifida				1				1	1
Pectus Carinatum			1				1		1
Microtia			1				1		1
Intersex					1	1			1
Urethral Valves			1				1		1
Hemangioma of Face						1		1	1
Syndactyly				1				1	1
Cheiloschisis					1		1		1
Lip Pits			1				1		1
Bilat. Blockage of Naso Lacrimal Ducts					1		1		1
Total	1		19	21	14	2	34	23	
	1		40		17		58		58
Per cent	1.7		69.0		29.3		100.0		100.0

* Included in the total are 8 patients who had two or more additional anomalies totaling 11 additional anomalies in all.

type) were referred to this institution for malformations other than the cleft palates. This is further exemplified by the fact that a significant number of the cleft palate patients with associated malformations fall into the group of syndromes which accommodate this particular defect as a frequent constituent, *i.e.*, Pierre Robin syndrome, lip pits, and hypertelorism. Nevertheless, these results are in accord with the assumption that cleft palate is commonly seen when multiple anomalies are present.[15]

The most frequent anomaly was Pierre Robin syndrome (17.2%). This malformation along with congenital heart defects (12.1%), hypospadias (6.9%), and inguinal hernia (6.9%) constituted nearly one-half of the total associated malformations. The sex differences which were recorded for each cleft group are significant in that there was a disproportionate excess of males in the combined defect group (14:16, 87.5%), as opposed to a slight female excess (21:40, 52.5%) in the isolated cleft palate group. These figures, including the overall F/M ratio of 0.675, are somewhat reflective of the ratios encountered in the overall cleft series and probably do not represent any significant sex-associated malformation tendencies other than those encountered in the cleft defects alone.

Maternal Age and Birth Rank

Numerous inquiries have been made into the significance of the age of mothers giving birth to infants with cleft defects and the birth rank of children having such defects. The results of investigation in man have been rather inconclusive to date. MacMahon and McKeown[16] recorded the birth rank of 276 patients with cleft defects, and the maternal age at the time of the birth of the proband for 248. Comparing their results to 1,105 control births, they concluded that the incidence of CL + CP was unre-

lated to birth rank but increased with maternal age. The incidence of isolated cleft palate appeared to be independent of both maternal age and birth order. Fraser and Calnon,[4] in their study of 456 patients with cleft deformities, found advanced maternal age at first birth in females with cleft lip and with males who had CL + CP. They also noted significantly increased paternal age in both sexes with the combined defect, and concluded that new paternal mutations were of importance in the pathogenesis of this condition. Woolf *et al.*,[17] found no relationship between birth order and cleft occurrence, but discovered a positive relationship between maternal age and CL ± CP, although not between maternal age and CP. Knox,[18] in a study of 341 patients with cleft anomalies, found a raised mean maternal age in all three cleft categories and showed no substantial differences from the general population in terms of birth rank. A tendency for cleft palate births (34.5%), and the combined defect (31.5%) to occur as fifth or higher births, was found by Ingalls *et al.*,[19] in a study of 100 Pennsylvania infants with the malformations. Compared to the expectancy rate of 16 per cent in the general population, these figures were quite significant. Also, contrary to previous investigations, they found no significant connection between maternal age and cleft defects. They suggested that environmental determinants were important in the etiology of clefting, and that modern methods of inquiry were not delicate enough to differentiate between environmental influences which might enhance hereditary susceptibility to palatolabial defects and the hereditary predisposition itself. Gilmore and Hofman[5] studied 2,162 cleft births over a 20-year span (1942-1962) in Wisconsin, and found that when these were compared to non-cleft births during the same period, there was a relationship between birth order and the occurrence of clefts, with a considerable increase in the incidence of clefts beyond the seventh pregnancy. (The ratio of observed to expected was 1.77:1.) They did not, however, categorize the births according to cleft type. Their data did not support the theory that clefts may occur more frequently in children of parents at either extreme of the age continuum. Bardhan[20] noted a striking correlation between oral clefts and advanced age groups of parents, and an increased incidence of clefts in the plural births. He concluded that the greater incidence of oral clefts in higher birth ranks was indirectly influenced by the greater age group of the parents.

In the present study, 243 patients were evaluated for the maternal age at the time of each patient's birth. The age groups were categorized into: (1) under 24 years; (2) 25 to 34 years; (3) over 35 years, for convenience in comparing the results with those in the literature. The number expected in each group was computed from birth statistics of the general population. The averages represented 43.7 per cent for the first age group; 44.3 per cent for 25-34 years; and 11.9 per cent for 35 years and older. These values were used because of lack of more suitable control data and are summarized in *Table VI.*

As noted in *Table VI,* the deviations between observed and expected values for CL (0.5 P 0.3) and CP (0.2 P 0.1) were not significant. However, in the combined defect group there was noted a significant correlation with the mother's age (P 0.001), with a relatively large number of the clefts occurring after the age of 35. These results support the con-

TABLE VI

MATERNAL AGE OF PATIENTS WITH CLEFT DEFECTS

	24 YRS. OR UNDER	25-34	35 YRS. AND GREATER	*Total*	
		Cleft Lip			
Observed	8	10	5	23	X^2 (2df) = 2.13
Expected	10	10.2	2.8	23	
Deviation	−2	−0.2	+2.2		0.5 > P > 0.3
		Cleft Palate			
Observed	26	37	13	76	X^2 (2df) = 3.47
Expected	33.2	33.6	9.2	76	
Deviation	−7.2	+3.4	+3.8		0.2 > P > 0.1
		Cleft Lip and Palate			
Observed	50	60	34	144	X^2 (2df) = 18.97
Expected	62.9	63.8	17.3	144	
Deviation	−12.9	−3.8	+16.7		P < 0.001
Total	84	107	52	243	

clusions reached by others,[3, 10, 16, 21] that a statistically significant relationship exists between maternal age and cleft lip + cleft palate, but not between maternal age and isolated cleft palate. The above investigations, however, did not separate the cleft lip groups from the combined defect series. Thus, no statistics are available with which to compare the discordance found in the present cleft lip series.

Distributions by birth order for the three main types of cleft anomalies are recorded in *Table VII*. Comparing the percentages according to birth order in each cleft group with the other cleft groups showed no substantial variation. A relatively higher percentage of births beyond the fourth pregnancy was found in the combined defect group, but the significance of this family is difficult to evaluate because of the larger number of patients in the cleft lip and palate group, and the possibility of sampling error.

To test the hypothesis that these malformations are independent of birth order, the results were compared to average expected percentages per birth rank in the general population. These results are summarized in *Table VII*. The deviations observed in each of the cleft groups were not significant. These data are compatible with the absence of any significant relationship between birth order and the occurrence of cleft anomalies. This observation is supported in the literature by the investigations of MacMahon and McKeown,[16] Woolf *et al.*,[17] and Knox,[18] but not by Mazaheri,[3] Ingalls,[19] Gilmore and Hofman,[5] and Bardhan.[20] The reason for the discrepancy among various investigations is unclear at present. The various methods of evaluating the role of birth order have been reviewed by McKeown and Record.[22]

Familial Distribution

Genetic implications in cleft deformities have found recent support. Curtis *et al.*,[23] in determining risk figures for genetic counseling, found that the incidence of CL ± CP in sibs of patients with the same defect was not affected unless a parent was also affected. They found that the probability of a sib of a patient with CL ± CP having CP was no greater than that in the general population. However, in studying isolated CP patients, they found that the risk in a sib being similarly affected was much greater with a positive family history for the defect. They concluded that this difference suggested genetic heterogeneity in the isolated CP group. Rank and Thompson[24] suggested that CL ± CP is not of the genetic system producing CP alone. The results of Woolf *et al.*,[17] were similar to those reported by Curtis and associates.[23] Knox[18] found that the cleft

TABLE VII

THE COMPARISON OF OBSERVED NUMBER TO EXPECTED NUMBER OF CLEFT MALFORMATION ACCORDING TO BIRTH ORDER

BIRTH ORDER	OBSERVED	EXPECTED	DEVIATION	
Cleft Palate				
1	12	10	+2.0	
2	8	10	−2.0	
3	9	7.2	+1.8	X^2 (4df) = 8.89
4	10	6	+4.0	
5+	1	6.8	−5.8	$0.10 > P > 0.05$
Total	40	40		
Cleft Lip				
1	9	5.5	+3.5	
2	5	5.5	−0.5	
3	3	4	−1.0	X^2 (4df) = 4.64
4	4	3.3	+0.7	
5+	1	3.7	−2.7	$0.50 > P > 0.30$
Total	22	22		
Cleft Lip and Palate				
1	38	27	+11.0	
2	22	27	− 5.0	
3	14	19.4	− 5.4	X^2 (4.df) = 6.96
4	16	16.2	− 0.2	
5+	18	18.4	− 0.4	$0.20 > P > 0.10$
Total	108	108		

rate among siblings and parents was about 2 per cent, and that there existed a significant familial concordance rate according to the variety of cleft, but that there was a sufficient number of exceptions to support the conclusions of Rank and Thomas. Knox observed more births in families of children with the combined defect than in the other two types of malformation. He suggested that the genetic determinants might be associated with lethal effects affecting family fertility, and that failure to be born is at least as frequent a manifestation of those determinants as is the malformation itself. Ingalls *et al.*,[19] reported that CL ± CP occurred with a higher frequency among relatives of patients than in the general population. They also found concordance with previous investigations in the cleft-type familial tendencies. Similar results were found by Gilmore and Hofman.[5]

Metrakos *et al.*,[25] in a comprehensive review of clefts in twins (108 pairs) found concordance in 31.0 per cent of monozygotic twins, as opposed to 6.3 per cent in dizygotic twins. Concordance was noted to be more frequent in CL ± CP than isolated cleft palate alone. They concluded that the higher degree of concordance among the monozygotic twins was indicative of hereditary factors for the production of clefts of the lip and palate.

Approximately 30 per cent of the patients in the present study had relatives with cleft anomalies. These figures are somewhat higher than those reported by Knox,[18] who found 11.7 per cent of patients with clefts reporting a familial occurrence of cleft anomalies. However, the similarities of percent distribution observed between the different cleft groups is compatible with those reported by others.[5, 19]

A total of 76 relatives with cleft malformations were recorded. The majority of clefts were found in the paternal and maternal relatives as opposed to the patient's immediate families. Concordance between the types of cleft in the patient and the type of cleft in the relative was noted in the isolated CP group (11:18), and the combined defect group (25:48), with each showing a majority of the relatives (over 50%) in each group. This was not demonstrated in the isolated cleft lip group.

To test the null hypothesis of independence of type of cleft in the patient and type of cleft in the relative, Chi square tests were performed. The results are summarized in *Table VIII*. Only in the isolated CP group and the CL + CP groups were the differences significant. Thus, in CP and CL + CP it is concluded that there is a relationship between the type of cleft in these patients and the clefts observed in their relatives. However, there were a number of discrepancies in relatives outside the immediate family. This suggests that a lack of a strong genetic relationship to the patient may modify the expression of the deleterious genes, or that unreliable reporting occurred due to the patient's lack of intimate knowledge of the relative's condition. On the other hand, the discovery of discordances within the immediate families of these patients seems to cast doubt upon the exclusiveness of CP and CL ± CP, and, as Knox[18] has suggested, may indicate that single genetic determinant is capable of causing all three kinds of lesions.

Summary

A study of variables encountered in the etiology of cleft lip and cleft palate was made and included a review of the literature accompanied by independent investigation. Attention was directed toward the significance of sex, race, associated malformations, maternal age, birth order, and familial occurrence of specific cleft defects in cleft lip and palate etiology.

Research material was obtained by reviewing the

TABLE VIII

CONCORDANCE BY TYPE OF CLEFT BETWEEN PATIENTS AND AFFECTED RELATIVES

	Cleft Malformation in Patient									
	CLEFT LIP			CLEFT PALATE			CLEFT LIP AND PALATE			
Type of Cleft	OBS	EXP	DEV	OBS	EXP	DEV	OBS	EXP	DEV	*Total*
Cleft Malformations in Relatives										
CL	3	3.3	−.3	0	6	−6	9	16	−7	12
CP	3	3.3	−.3	11	6	+5	14	16	−2	28
Total	4	3.3	+.06	7	6	+1	25	16	+9	36
CL + CP		10			18			48		
	X^2 (2df) = .376			X^2 (2df) = 10.34			X^2 (2df) = 8.37			
	0.95 > P > 0.90			0.01 > P > 0.001			0.02 > P > 0.01			

hospital charts of 266 patients with cleft defects, who were admitted to Kansas University Medical Center between January 1, 1965 and December 31, 1970. Questionnaires were mailed to the above patients. The results from this study are as follows:

(1) Isolated cleft palate was observed in 36 per cent of the patients studied and showed a female preponderance in the F/M ratio of 1.27:1. The more severe complete cleft palate defect showed a F/M ratio of 1.83:1, whereas the partial cleft palate defect showed a sex reversal relationship in the F/M ratio of 0.73:1.

(2) Cleft lip and cleft lip and palate were observed in 10.9 per cent and 57.6 per cent of the patients studied, and in each case a marked male preponderance was found (cleft lip F/M ratio 0.38:1, and cleft lip and palate F/M ratio 0.48:1).

(3) The majority of patients studied were Caucasian (97%). Negro patients accounted for 1.9 per cent of the total, and patients of mixed origin accounted for 1.1 per cent. These findings support the theory that cleft defects occur less frequently in non-white people than in white people.

(4) A total of 58 associated anomalies were demonstrated in 48 of the patients with cleft malformations. Sixty-nine per cent of the associated anomalies were found in patients with isolated cleft palate, suggesting that this cleft defect is the prime target for other malformations in the cleft lip and palate groups.

(5) A significant relationship was found between maternal age and cleft lip and palate ($p<0.001$), but not for isolated cleft palate or cleft lip.

(6) There was found no relationship between birth order and the occurrence of cleft anomalies.

(7) A significant relationship between the type of cleft in the patient and the cleft defects observed in the patient's relatives was noted for the isolated cleft palate group and the combined defect group, but not for the cleft lip group. There were, however, enough discrepancies found in each group to suggest the possibility of a common genetic determinant causing all three kinds of lesions.

APPENDIX

SAMPLE QUESTIONNAIRE

Name of Patient ..... Age ..... Sex....

Name of Parents if Patient Is Child .....

Address .....

.....

1. Did you (or your child) have a cleft lip, a cleft palate, or both?
2. Location of the cleft—right, left, middle, both sides? (CIRCLE ONE)
3. What was the birth order of the affected child with the cleft lip/palate? (first-born, second-born, etc.)

   For the following questions, if your answer is "Yes," please explain on the reverse side of this questionnaire.
4. Were you (or your child) born with other birth defects?
5. Do you have any relatives who also have cleft lips or palates?
6. Do you have any relatives with other birth defects?
7. Additional comments (please use other side if necessary).

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The President's Message

Unionism

In this issue, David Gray has written an interesting editorial. I hope it reflects all of our feelings, but one can never tell what the future may bring. Therefore, if I may, I add this codicil.

There is currently much discussion across the country of "unionism" and whether the existing structures of medicine could serve as a guild. Recently, one of those unsolicited journals carried opinions as to the advisability of forming trade unions and, according to the article, apparently such do indeed exist. They seem to have held at least one wide-area convention.

The concept of yet another group to belong to, to attend, to work for, and to support, even though it appears worth while, would place additional loads on all of us. Should such a course seem advisable, in time to come, the Kansas Medical Society can, by slight alteration, be made to function as a guild. It could function well in an expanded role because it is dynamic, has excellent membership response, and, by all apparent criteria for judgment, holds the confidence of its members.

FORMATION OF SEPARATE UNIONS WILL ONLY FURTHER DIVIDE PHYSICIANS.

About a month ago, in our meeting with the Commissioners, the Executive Committee directed Charles R. Svoboda, who heads the Commission for Sociology and Economics, to form a Committee on Contract Practices to study the whole subject of unionism. I am sure we will all be interested in their report.

Kenneth L. Graham MD

President

Editorial COMMENT

In Union There Is What?

Among the activities of the day which would have seemed unbelievable a few years ago is the trend toward the formation of unions by physicians. The profession is not particularly in need of another area of contention but there it is. The movement has been born of fear and frustration similar to but distinctly different from the emotions which prompted the trade unionists of the last century.

As the feudalism of aristocracy gave way to the feudalism of industry, the laborer found himself trapped by the lack of mobility, lack of education, and lack of capital. Working hours and conditions were often intolerable and there was no dignity of the individual as a contributor to the industrial product. He found he had one potent weapon—himself—as long as he combined with his fellow workers to offer or withhold their services as a unit. He learned and performed his lesson well so that, if not a new feudalism, he has at least produced a new aristocracy whose power would shock the Caesars. But that is another matter.

We now see the physician attempting to emulate the method. He fears the threat of exploitation, the incursion of outsiders, the debasement of his remuneration. He is frustrated by clerical duties which separate him from his professional duties, by the prospect of his function being controlled not by his professional capabilities but by some socio-political formula. A narrow path of logic leads some to the conclusion that physicians must combine themselves into a single unit to combat these threats with all the power inherent in the service the profession can provide or withhold. It is the very nature of this service, however, which separates the physician from other laborers and throws more than a little doubt on the wisdom of imitating their actions.

Most physicians, we think, will find themselves somewhat uncomfortable at the prospect of unionization. Even some of the promoters have chosen to call their organizations guilds, giving them a certain aura of quality and abjuring some of the undesirable connotation of the term union. At the very start, they are saying, "Well, we are but we really aren't."

The question is, why do we need to establish a union, anyway? The answer is that the proponents of unionization do not consider the current medical organizational structure capable of responding to the wishes of the physician members or controlling their actions. They are dissatisfied with past efforts at negotiation and, in fact, blame the organization that negotiations are becoming a way of life. They blame the organization for the fragmentation of medical effort. They see the organization as impotent to combine its members into a cohesive unit which can meet the assailing forces with the strength of unity. And so they want to establish another organization.

The medical society has traditionally been professionally oriented. It began as a forum for the reporting and exchange of scientific information—and some not so scientific. But two things have happened. First, the increase in the number of physicians has brought a concomitant increase in the size of the organization, with the inevitable complaint that comes to a democratic institution that it is not responsive to the individual. This seems to occur at every level—local, state, and national; the difference is quantitative. The second change is that social and economic pressures have forced the society, primarily and wishfully concerned with professional matters, to speak increasingly on social and economic matters, often ineptly and with undesired effect. From the inside, the efforts have been criticized as too little, too late, and misdirected. From the outside, since the professional accomplishments are not of immediate interest, it appears that the maintenance of the physician's financial position is the only concern of his professional group. So, emphasizing that the professional society is incapable of doing a proper job and anyway it is better to divorce the two aspects of practice, the medical unionists are issuing their call.

We believe this approach is objectionable. We believe the established medical structure should be the origin for any negotiations for the reason that it *is* professionally oriented and will therefore negotiate from the position of strength inherent in the attitude of people toward their medical advisers. Physicians are quick to feel abused and resent the many publicized criticisms of the profession. But if we stop and look at the whole picture, there are more significant indications of approval—even of letting the

physicians run their own business. Not from the politicians or newspaper columnists, perhaps, but the people who are the patients. There must be some reason the medical profession remains at or near the top of the polls of respected and admired groups. The socio-economic function should derive from the professional function. There is no reason those working within it cannot do as effective and efficient a job as a separate group intent only on this one aspect of medical life.

But the greater objection is the identification of any union concept with its prime weapon, the strike. This is, after all, the essence of union effort. All the achievements of unions, regardless of their virtue and need, have been based on the strike or its threat. This would be, then, as much a part of the medical union effort as it has been with the trade unions. Apparently, those who favor the union approach believe (and perhaps rightly) that the professionally oriented society could never hold its membership to this commitment. Therefore, a separate organization must be promoted, one whose interests are unabashedly economic and more likely to attract to its working core a mentality willing and capable of applying this leverage. But the laborer who strikes his employer, however good the cause, inflicts upon the consumer of his ultimate product only a transient deprivation, inconvenience, or expense. The physician who strikes is inflicting quite a different effect upon the consumer, his patient. The medical unionists are always careful to qualify any consideration of the strike function with the assurance that emergency care will be provided. And what is a medical emergency? Who decides? The physician? The patient? An evaluation committee of the union? Who convinces the physician that the patient he cared for yesterday shall be denied care today because a strike is on? Who records his thoughts after the strike is over and he views the effect on his patients and his practice?

The professional society, with proper implementation and backing based on the desire to fulfill its professional function but expecting an equitable arrangement regarding regulations and remuneration, should be the logical agent at the negotiating table. If, indeed, unionization does occur, the physician can assume full responsibility for the reaction of the public which sees this as abdication of professional principles in favor of self-seeking economic and political ones. If he wants to prove his critics right, this is the way.

One thing is certain. *If* physicians organize as an all-powerful union, and *if* they go out on strike, they need have no fear of going hungry. They'll have plenty of words to eat.—*D.E.G.*

REPORT ON ACS SURVEY

Two out of five of the 15,000-plus surgeons who responded to a recent survey by the American College of Surgeons have had a malpractice claim against them within the past 12 years. A claim is considered as any indication from a patient to the physician that legal action is being planned or started. And, according to ACS, if the present trend is projected through 1974, the total number of claims could easily reach one for every three surgeons. These and other preliminary findings of the survey on professional liability are reported in the May 1972 issue of the *Bulletin of the American College of Surgeons.*

Ninety per cent of settlements reported by the respondents were under $100,000, and 68 per cent of reported settlements were less than $10,000.

Twenty per cent of the respondents felt the suit had been stimulated by a poor result; another 20 per cent considered the stimulus to be an attorney. Lack of patient rapport and indiscreet comments by various persons were considered additional sources of origin for suits.

One-third felt that the claim arose as a result of the surgical procedure, while one-eighth of the respondents expressed their feeling the claim originated from events in the period after operation.

Twenty per cent had been co-defendants with hospitals in professional liability litigation; ten per cent had been co-defendants with a partner or an associate, and 14 per cent had been sole defendants.

Well over half of the respondents believe there is a professional liability problem in their geographic area.

KANSAS CORONERS REPORT

The Kansas Coroners Society held its annual meeting in Wichita, May 25-27, in conjunction with the semi-annual meeting of the Western Conference on Criminal and Civil Affairs. Many good papers of interest to coroners were presented.

Cyril V. Black, Pratt, was re-elected President; Robert H. Kelly, Wichita, Vice President; William C. Eckert, Wichita, Secretary-Treasurer.

Dr. Thomas T. Nogouchi, Chief Medical Examiner-Coroner of Los Angeles, made a short talk. The members present voted him into honorary membership in the Kansas Coroners Society. He then presented Dr. Black with a lapel pin as honorary Deputy Coroner of Los Angeles County.

The meeting next year will be held at the Annual Meeting of the Kansas Medical Society, and in 1974, again, the coroners will have the opportunity of having a program of interest to coroners.

AMA House of Delegates

Summary of Actions Taken at the Annual Convention, San Francisco, June 18-22, 1972

WE WOULD first refer all of the members of the Kansas Medical Society to carefully read the *American Medical News* as printed on July 3, 1972. This issue goes into appropriate detail on many of the resolutions and policy statements that were considered by the AMA House of Delegates in June, 1972.

The following excerpts, we feel, are worth repeating for the purpose of emphasis.

Inaugural Address: Carl A. Hoffman, President of the AMA

Shall the House of Medicine be a House united—or a House divided?

"That, in my judgment, is the central question before us at this moment in our history," the AMA's 127th president said. He noted that factionalism in the profession assumes a number of forms but "one form requires special comment."

"The cry for unionism is being raised in our profession as never before. There is no doubt that trade unionism has been an effective and valuable social instrument in our nation. But is it a proper activity for physicians to engage in?"

It is not, Dr. Hoffman said, because "unionism seeks its objectives through group power—and it achieves its power by carefully controlled conformity.

"This is the very objection we as a profession have raised against government-controlled medicine. The source of power of unionism lies in its ultimate weapon—the strike. A strike, even the threat of a strike, is a threat to withhold services. It is, therefore, *a violation of medical ethics.*

Concluding, Dr. Hoffman addressed himself to younger members of the House and to new physicians in general. He said, he believed in years to come, they would find that "this association alone represents American medicine." And as our society becomes more complex and the government larger, "there is an even greater need for institutionalized power outside of government," he said.

"In a few years this House of Medicine will be yours. Alter this House as you will . . . strengthen it if you can . . . but above all, preserve it."

Opinion Poll

The House received, and adopted, results of the first membership opinion poll on critical issues affecting the practice of medicine. The overwhelming majority of 94,000 respondents (73.1%) recommended that AMA continue to seek to retain the basic principles of private practice in any government-enacted health program. And more than half (55.7%) preferred the AMA plan of national health insurance over all others. The AMA plan was four times as acceptable as the next most preferable option, which was catastrophic coverage only (14.1%). If compulsory health insurance were adopted, 28.1 per cent of respondents said they would continue private practice "with those patients who would pay my private fees," and 24.6 per cent said they would "join the federal program and continue to practice under it." Many (21.6%) were undecided as to what they would do.

On the work of the Association, programs which received the greatest percentage of responses indicating "not enough" emphasis were: communications to the public (62.5%); practice management problems (39.8%); socio-economic issues (35.1%). A majority of members indicated AMA was placing "proper" emphasis on: scientific activities (66.3%); medical education (67.9%); continuing education (63.3%); membership benefits (51.8%), and communication to the medical profession (55.2%).

The questionnaire went to 177,882 non-federally employed members and 94,035 (52.9%) questionnaires were returned. The questionnaire also was sent to a random sample of 4,500 members, including federal physicians, and a random sample of 3,000 non-members of the AMA to test sampling techniques as a possible tool for use in future surveys.

Physicians' Assistants

Reflecting concern for "potential problems which could arise," the House approved a policy opposing employment of physicians' assistants in hospitals. The move was recommended by the Council on Health Manpower and the Board of Trustees, through Board Report B. "The Council believes that direct responsibility to and supervision by a physician is a critical element in the safe and effective performance of a physician's assistant," the report said. To the report's recommendation that an assistant "not function in that capacity when an employe of and paid by a hospital," the House added—"or (employed) by a full-time, salaried, hospital-based physician."

Also adopted was Board Report Z, proposing guidelines for compensating physicians for services of physicians' assistants. It urged legislation to em-

power state boards of medical examiners to approve a physician's employment of an assistant and to approve proposed functions of the assistant, as described by his employer. Reimbursement for assistant's services should be made directly to the employing physician, the report said.

Report Z was amended by adding: "The term 'physician's assistant' as used refers solely to new occupations being developed to assist the physician in delivery of personal care services, and not to such existing or established occupations as the medical office assistant."

This AMA House of Delegates does not condone the production, sale, or use of marijuana. It does, however, recommend that the personal possession of insignificant amounts be considered at most a misdemeanor with commensurate penalties applied. (The House) also recommends its prohibition for public use; and that a plea of marijuana intoxication should not be a defense in any criminal proceeding.

Fee Determinations

Delegates approved a strong resolution aimed at any independent determination of customary physicians' fees:

"Resolved, that where benefits include physicians' fees, management, labor, and third-party carriers shall consult with duly constituted representatives of organized medicine before determining 'usual, customary and reasonable fees,' " the measure said.

The resolution was adopted in lieu of several others, all protesting actions of Aetna Life and Casualty Insurance Company. It added:

"The medical profession will not condone or tolerate action on the part of any third party that would encourage or promulgate litigation in the settlement of any such dispute." This referred to a practice of telling policy holders that—except where there was prior agreement between patient and physician as to the fee—the insurance company would pay the patient's legal costs if the physician sued to collect his full fee.

The resolution also reminds physicians "that they have the right to enter into prior agreement with patients regarding the fee for services to be rendered."

Other actions taken by the House of Delegates at San Francisco are summarized below.

The bylaws were amended to offer medical students direct membership in the AMA if they cannot enter through the state society. (Medical students in Kansas are eligible.)

This recommendation on practice contracts was referred to the Judicial Council for further study:

> "There is no ethical prescription against suggesting or entering into a reasonable agreement not to practice within a certain area for a certain time, if it is knowingly made and understood. Whether it is advisable as being in the best interest of the public is debatable. Perhaps such an agreement should not become operative until after one year, and should expire after it has been in effect for a period of five or so years. Ethically, such agreements are not forbidden, but they should be entered into with caution."

They recommended that state societies and scientific sections examine now and periodically the conditions, qualifications, methods, procedure, tenure, and related aspects of the election of their delegates to the AMA House of Delegates.

On Contract Practice

> *Resolved,* That the House of Delegates of the American Medical Association remind all physicians that as free men and women they have no obligation to accept employment and remuneration under any conditions other than those arrived at by agreement between the physician and the recipient of his service."

On Peer Review

> *Resolved,* That wherever peer review mechanisms exist, it is essential that third parties make use of them, and, correspondingly, that the medical profession continue to support the development of peer review mechanisms; and be it further
>
> *Resolved,* That the AMA, through the Council on Medical Service, work with all national medical insurance carriers to develop in those areas where local peer review is not presently available, acceptable means of communicating with physicians and the insured that a given service or fee is not covered.

They resolved to the apparent satisfaction of pathology and radiology problems in connection with the creation of an American Board of Nuclear Medicine.

They asked state and local societies to cooperate with the Joint Commission on Accreditation of Hospitals, to study the system of keeping medical records in hospitals, and then gave the following guidelines:

> "Oral orders, of course, must be signed by the responsible physician, and where more than one physician share the responsibility of patient care, such as in a partnership, one may sign for another.
>
> "In any case where a diagnostic or non-surgical therapeutic procedure which carries risk to the patient, or any operation, has been performed, the physician who performs the procedure knows precisely what has been done and is accountable for the procedure. He alone can describe what was done and must validate it by his own signature. If his clinical partner in the same field is recorded as a participant in such a procedure, he of course would share the knowledge of what was done and could appropriately write the report or authenticate

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Personalities—IN KANSAS MEDICINE

George D. Marshall, Colby, talked to the Colby Rotary Club on local hospital needs.

Wayne E. Hird, Lawrence, has recently returned from a conference at the National Institute of Health, Bethesda, Md.

Harvey S. Smith, Concordia, recently attended a meeting on Diagnostic Cytology at the University of Illinois Medical School, Chicago.

J. J. Hamilton, Wakeeney, an active pilot, discussed the medical aspects of flying in connection with the Hill City Area Aviation Association meeting.

Newton C. McCluggage has joined the Chanute roster of physicians.

Albert N. Lemoine, Jr., Kansas City, was a speaker at a recent seminar held for the workers in the Services to the Blind Division.

William Nice, Topeka, addressed the Third Guest Lecture sponsored by the St. Marys Chamber of Commerce. His topic was, "Our Children, Drugs, and Alcohol."

Among those participating in the Annual Hertzler Memorial Lecture were **John A. Grove,** Newton; **Hubert M. Floersch,** Kansas City; **Charles Pokorny,** Halstead; **Clifford W. Gurney,** Kansas City.

John S. Spaulding, Kansas City, participated in a Birth Defects Seminar held at Colby recently.

P. J. Antrim, Anthony, and **F. G. Freeman,** Pratt, addressed the Cancer Crusade workers at a recent workshop.

Among those attending the Midwest Cancer Conference were **E. F. Steichen,** Lenora; **J. R. Bradley,** Greensburg; **Wesley Hall,** Girard; **Kenneth Zabel,** Pittsburg.

Bruce M. Burdick has opened the Manhattan Psychiatric Clinic in Manhattan. Dr. Burdick moved to Manhattan from Topeka.

William S. Simpson, Topeka, presided at the meeting of the American Medical Society on Alcoholism.

Andrew Nachtigal, Newton, addressed the quarterly meeting of the Harvey County Heart Association. The topic was, "Childhood Diseases Relating to Heart and Blood Diseases."

At the second annual Kansas Arthritis Foundation meeting, those participating were **Charles H. Miller,** Parsons; **R. H. Hill,** Meade; **George D. Belcher,** Columbus; **Forrest H. Jones,** Columbus.

R. M. Thomas, Marysville, discussed drug abuse as guest speaker at P.E.O. Sisterhood. The lack of coordination among the many agencies prevents effective control of drugs in America, was pointed out by Dr. Thomas.

R. R. Fischer, Manhattan, has conducted a public discussion on feminine hygiene, birth control and venereal disease. The lecture is part of a series conducted by Manhattan physicians and health personnel.

KMS Obituaries

LESLIE L. HUNTLEY, M.D.

Dr. Leslie L. Huntley, 69, of Washington, died May 27, 1972, at his home. He was born January 10, 1903 in Shickley, Nebraska.

Dr. Huntley was graduated from the Nebraska University School of Medicine and began his practice in Washington in 1946, after having served as a missionary to West Africa, and having done postgraduate studies at the School of Tropical Medicine in London.

Surviving Dr. Huntley are his wife, a son and two daughters. A memorial fund has been established at the First National Bank, Washington.

FRANK A. MOORHEAD, M.D.

Dr. Frank A. Moorhead, 64, of Neodesha, died March 10, 1972, at his home. He was born October 3, 1908 in Neodesha, where he lived all his life.

Having been graduated from the Northwestern University School of Medicine in 1935, Dr. Moorhead began practicing in Kansas in 1936.

Survivors include his wife and two sons. A memorial fund has been created. Contributions to a nursing scholarship fund may be sent to Mrs. Harry Depew, 1226 North 6th, Neodesha, Kansas 66757.

CLYDE E. PARTRIDGE, M.D.

Dr. Clyde E. Partridge, 76, of Emporia, died April 19, 1972, at a local hospital. He was born November 7, 1895 in Osage City.

Dr. Partridge was graduated from the Rush Medical College of Chicago in 1926. He began his medical practice in Kansas in 1933.

Surviving Dr. Partridge is his wife. A memorial fund has been established at the Newman Memorial County Hospital, Emporia.

DAVID W. STUBBS, M.D.

Dr. David W. Stubbs, Topeka, died May 10, 1972. He was born November 18, 1934 in Whitewater.

Dr. Stubbs was graduated from the University of Kansas School of Medicine in 1963.

Surviving Dr. Stubbs are his wife and three sons. Memorial contributions may be made to the University of Kansas Endowment Association Memorial Fund.

Instrument or Impediment

The Regulatory Monograph in Medical Communications

JOHN ARCHER, M.D.

AT LEAST one type of publication becomes important in some way to most writers involved with prescription drugs. I have in mind the monographs addressed to physicians and inserted into drug packages by manufacturers. These documents are technically part of the "labeling" of the respective drugs, and as such, their content is subject to regulation by the Food and Drug Administration (FDA) under the Federal Food, Drug, and Cosmetic Act. Their purported mission is to inform physicians about the properties of the drugs and thus to lead to judicious prescribing practices. During the past decade, they have acquired a mystique that I propose to examine.

In addition to labeling, these publications are variously spoken of as "package inserts," "package stuffers," or "full-disclosure statements." I think the term *regulatory monograph* is a better designation, for reasons to be mentioned. However, that expression could be misleading unless there is an understanding about just what is regulated and what is not. I will attempt to clarify the term, but will sometimes revert to the more common one, package insert.

History

A brief narrative on the evolution of the regulatory monograph may help one understand its proper status as well as some myths that have grown around it. Its origin can be traced to the Pure Food and Drugs Act of 1906. In this act, labeling requirements took the form not of a comprehensive delineation of content but of a proscription: the labeling of a drug was forbidden to be intentionally false or misleading.

Following a therapeutic catastrophe, the Federal Food, Drug, and Cosmetic Act of 1938 replaced the old Pure Food and Drugs Act. The immediate stimulus for the new law came from widespread poisonings, often fatal, from a preparation of sulfanilamide containing a toxic solvent. As an interesting legal nuance, the federal government had no jurisdiction to seize the poisonous pharmaceutical preparation merely on the grounds of lack of safety. The jurisdiction came from the labeling, which was considered "false and misleading" by misbranding the product as an "elixir." The term elixir implied that the solvent was alcohol, when in fact it was diethylene glycol.

To prevent another disaster like the "elixir of sulfanilamide" affair, the 1938 Act required that new drugs be tested for safety before marketing. The evidence is submitted to the FDA in the form of a New Drug Application (NDA). The law continued and strengthened the prohibition against false and misleading labeling, but it also went further and required that all drugs be labeled with adequate directions for use. These directions include such matters as therapeutic indications, recommended dosage, disclosure of possible adverse effects of the drug, and necessary warnings which have a bearing on safe use. The basis for the current regulatory monograph is contained in that requirement.

Before examining the implications of the term, adequate directions for use, I will skip from 1938 to 1952, when some serious defects in the law were corrected by the Durham-Humphrey Amendment. Before that amendment, many drugs were, as now, restricted to sale only upon prescription. Drugs that could legally be sold over the counter to laymen, however, were often also labeled by some manufacturers for prescription sale only. Thus, the validity of the prescription legend was compromised when one brand of, say, aspirin was labeled for sale without prescription and another brand beside it on the pharmacist's shelf was labeled for sale only by prescription. Among other things, the Durham-Humphrey Amendment abolished this incongruity. If adequate directions for use of a drug by the layman can be written, they are now required to be written in the labeling, and the manufacturer is not entitled to label the drug with a prescription legend. A physician may, of course, still write a prescription for the drug if he chooses, but the manufacturer cannot restrict it to prescription sale. It surprises many people that, regardless of how the distinction is really made in actual practice, the legal difference between a prescription drug and an over-the-counter drug is not some degree of relative safety per se, but instead involves a labeling decision: whether adequate directions for use can be written for the layman.

With few exceptions, the manufacturer's directions for use of a prescription drug are written for the physician and not the patient; directions for the patient are normally typed by the pharmacist in ac-

From the Department of Drugs, American Medical Association, Chicago.

Read in part before the 1971 annual convention of the American Medical Writers Association, Chicago, Sept. 18, 1971.

Reprint requests to 535 N. Dearborn St., Chicago 60610 (Dr. Archer).

cordance with the physician's instructions. In the past, many manufacturers met their legal obligation for providing these adequate directions for use merely by printing a statement on the label to the effect that "professional literature is available upon request." The literature thus promised had the status of labeling. If the drug was "new" within the interpretation of the law, the exact wording of the literature was specified in the NDA. If a physician made a request for a copy actually pursuant to the label statement, the manufacturer was obligated to send one. In practice, however, such requests were not commonly made. Thus, this official labeling might exist more in theory than in fact. Varying with the company and the drug, promotional brochures and other advertising might or might not conform to the labeling, and full disclosure of its contents might or might not be present.

Beginning around 1950, the FDA began to require that all packages of injectable drugs actually contain the labeling providing adequate directions for use. Henceforth, having this available upon request was not enough. If the assumption is granted that the contents of the documents are valid, this requirement makes eminently good sense. Injectable drugs clearly come into the hands of the physician, the intended reader of the package insert.

In 1961, however, regulations were published and became effective early the next year requiring that these package inserts also be supplied with prescription drugs taken orally. (Only a few old, well-known drugs were exempt.) This requirement makes sense only to those with a bureaucratic mind. Most packages of medications given orally do not come into the prescribing physician's hands. However, a regulatory motive was involved in requiring this essentially wasteful practice of stuffing packages with these documents. Coupled with that requirement was another that all other promotional material be consistent with the package insert and contain full disclosure of what the federal government regarded as its important contents. (Journal advertising was then exempt but is no longer.) I have never understood any compelling reason why the government could not have invoked its full-disclosure requirements without tying them to tangible wads of paper placed in drug packages. The regulatory monograph could just as well have taken the form of labeling available upon request. Nevertheless, I do acknowledge that certain administrative conveniences accrued to the government from the procedure it adopted.

Popular misconception attributes these package insert-full disclosure regulations of the drug amendments of 1962, often called the Kefauver-Harris Act. However, they were in effect under the basic 1938 law months before the amendments were enacted. There was far less that was fundamentally new in these amendments than most people realize. Nevertheless, among other things, they did codify the requirement that new drugs not only be proved safe but also effective for their intended use, as reflected in the proposed regulatory monograph. Already, the FDA, through a process of evolution, had come more and more to require that effectiveness be demonstrated, but the artifice of relating efficacy to safety in various ways was necessary. The new law facilitated the insistence upon better proof of efficacy. If the agency now often requires that proof to be too extensive, and acts upon it too slowly, that is a defect of administration and not of the law itself. In any event, the matter is important to this discussion only in a peripheral way.

Informational Scope

The ritualistic stuffing of regulatory monographs into drug packages may be slightly silly, but otherwise I have no real quarrel with the concept of the documents as thus far presented. The great problem is the faulty perspective in which they often are considered. In the minds of many people, including both medical writers and physicians, regulatory monographs have been accorded an authoritarian stature that they neither possess nor deserve. Considered strictly as items of medical information, they collectively possess qualities and suffer defects common to medical communications in general. But a unique set of circumstances gives these features a distinctive character in regulatory monographs.

The fact that the authors of the monographs often possess a large accumulation of data, frequently unpublished elsewhere, can lend a comprehensiveness to the information that is sometimes unrivaled. If these data are occasionally misinterpreted, that is a hazard generally present in medical writing. The failure of the documents as intrinsically valid communications is more fundamental; it results from the system that generates them.

A publication purporting to give information about a drug should have a single, primary purpose: to inform. Yet a regulatory monograph carries the added burdens of serving as a promotional brochure for the manufacturer, reflecting the administrative policies of a governmental agency, and acting as a legal document for both. It is developed jointly by representatives of both parties whose interests often conflict. Fear of public castigation by any variety of predatory critic may influence the eventual product. The resulting monograph may still contain valuable information that the prescriber should consider. But the collateral influences on its preparation too often introduce much that is inaccurate, incomplete, vague, misleading, unsoundly delimiting or exigent, and sometimes otherwise invalid.

This argument is not intended to suggest that physicians should ignore regulatory monographs. I believe the documents should be read, but with an understanding of their overall purpose and within the

perspective of other sources of medical information. They should be evaluated with a view to how well they reflect prescribing standards, but they should never be allowed to set those standards. Yet a cult has arisen that presumes there is something vaguely illegal or improper about a physician prescribing a drug in some manner that is not in conformity with a package insert. If accepted, this doctrinaire notion would allow such documents not merely to make recommendations and suggestions but actually to circumscribe all conditions of using a drug—the therapeutic indications, the dosage, the duration of administration, the patient population to be treated; often, in cookbook fashion, they would even dictate the physician's daily management of his patient.

The regulation of the practice of medicine involves a large body of laws, statutory and common, federal and local. Ethics and standards of competence set by the profession itself are equally demanding, but nothing in the Federal Food, Drug, and Cosmetic Act constrains a practicing physician to have his medical decisions determined by a pharmaceutical company and the FDA through a package insert that the physician has been no party to preparing.

Effect on Medical Practice

The notion that the package insert has some authoritarian force over a physician's prescribing practices largely resulted from a bit of regulatory history not yet mentioned. The Food, Drug, and Cosmetic Act has always made provision for the distribution of premarketed new drugs to investigators in order that the clinical data could be developed for submitting an NDA. Some events in 1962 convinced the Secretary of Health, Education, and Welfare that federal monitoring of this distribution and investigation was needed. Accordingly, in the summer of 1962, the FDA published proposed regulations that would require a manufacturer or comparable distributor of investigational drugs in interstate commerce to submit a notice (which eventually came to be known as an IND) and to conform to certain procedural requirements during the investigation. This precise set of regulations never became effective; while they were pending, the Drug Amendments of 1962 were enacted, and the regulations were rewritten largely to incorporate the efficacy provisions of the new law. However, the eventual regulations contained the basic substance of those proposed initially. It is interesting that the 1962 amendments, which usually receive credit for instituting the IND procedure, probably delayed the procedure from being invoked under the basic Act!

Among other things, the procedure obligates the interstate distributor of an investigational drug to make certain requirements of its clinical investigators. Physicians who prescribe or administer the drug under such an IND sponsor submit professional qualifications, adhere to a stated plan of investigation, keep records, report results, and obtain informed consent from patients or subjects. While certain details of the demands on manufacturers' investigators may warrant criticism, I think we can agree that drug investigation must be conducted responsibly and ethically. The IND requirements help to safeguard that principle, and their basic intent deserves endorsement.

The real problems that the IND procedure have created stem mostly from a growing misunderstanding of its scope and its proper application to the use of drugs. There is only one legitimate motive for filing an IND: to accumulate data for an application to market a drug, or for changing the labeling recommendations of some brand of a drug already on the market. Most important to this discussion, these investigational programs are directed not just to determine the intrinsic properties of a drug alone, but also to determine what the manufacturer proposes to say about them in the labeling (ie, the regulatory monograph). Practicing physicians generally conduct the investigations under the sponsorship of the manufacturer, but the basic transaction is properly between the manufacturer and the government. The statutory intent of the procedure is that an investigation will proceed until a conclusion can be drawn. If a drug is found safe and effective for its intended use, the purpose of the procedure is the eventual submission of an NDA. If a drug is found unsafe or ineffective, the investigation properly should be abandoned.

In practice, however, many alleged "investigational" programs go far beyond the truly experimental stage and become therapeutic programs under a formal guise of investigation. Whether this results from bureaucratic lethargy and reluctance to make decisions by the FDA or from inept preparation of NDAs by the industry seems to depend upon who is accusing whom at any given moment. It is discomfiting, however, for a patient to be told he is the subject of an experiment when in reality his physician is merely treating him in a sound manner that would be regarded as fully established by the medical community even if not by the government. Under the IND procedures, scant leeway is provided for anything else. Even with a marketed drug, when a physician places himself in a role of "clinical investigator" under an IND sponsor, he may be legally required to practice such artifice. However, a physician in the normal course of his practice is under no such compulsion. Yet, despite the one legal reason for an IND (preparing to submit an NDA), individual physicians have often been induced to submit abortive versions of one merely to treat their patients in some manner not described in a drug company's package insert.

The FDA explains its encouragement of the private, artificial INDs as a means of gathering infor-

mation. While I would never oppose a physician's furnishing information on his experiences with drugs to the FDA, I can see no purpose in engaging in the legal fiction represented by a private IND to do so. This dissembling procedure could be replaced by some forthright mechanism through which practicing physicians could voluntarily share with the government any worthwhile data they accumulate on drug use. A few FDA officials, to their credit, have publicly confirmed that the Federal Food, Drug, and Cosmetic Act does not dictate how a physician may use a marketed drug. I am certain, however, that after a decade of confusion, many physicians who engage in the rigmarole of the private INDs somehow think they must; they supplicate for a privilege that cannot be legally withheld. Even worse, I know that many physicians feel so intimidated that they withhold good, medically indicated treatment from patients just because one of these package inserts has failed to endorse the regimen. Medical writers share much of the blame for this deplorable compromise of best medical practice. They have failed to recognize, and have helped to perpetuate, a pernicious laxity of diction that has confused words having technical, regulatory meanings with their common, everyday definitions.

A Problem of Semantics

A "new drug," for example, in the regulatory sense, is often not new at all. The FDA has so broadened the term that it can virtually be applied to any drug in interstate commerce that does not yet have labeling providing for some contemplated condition of use. In fact, the agency has sometimes succeeded in applying the term to substances that are not even drugs.

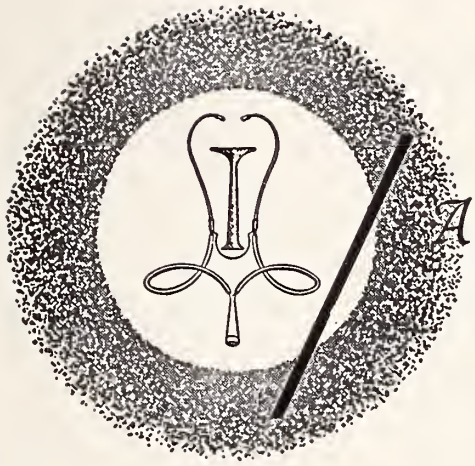
"Full disclosure" is particularly troublesome; it really means the complete duplication in promotional material of the essential content of a regulatory monograph. It cannot possibly mean what it tends to imply: full disclosure of all important information about the drug involved; not only are regulatory monographs incomplete in this respect, but many actually suppress information for administrative, regulatory reasons.

Especially important to this discussion is the insidious semantic shift that is translating "investigation" within the narrow scope of the Food, Drug, and Cosmetic Act into "experimentation" in the usual sense. By definition, a manufacturer must treat a new drug as investigational until everything in the proposed labeling has FDA approval. But the existence or absence of an administrative action by the federal government cannot and should not determine the investigational or experimental status of a therapeutic agent or procedure in the broad, traditional, common-language, medical sense of the words. A medical procedure ordinarily becomes an established and accepted part of the therapeutic armamentarium, if it ever does, by gradual degrees. Some new use of a drug might become a standard, generally accepted treatment of choice for a disease before any drug firm even developed a commercial interest in recommending such use, to say nothing of submitting an NDA. On the other hand, many circumstances can be visualized in which a drug might be used strictly according to a package insert and still be used improperly or even experimentally by broad definition.

With respect to therapeutic claims, it is well to remember that a package insert is fundamentally a manufacturer's sales brochure which the FDA is charged with trying to keep honest. If the medical profession permits these documents to set the standards for prescribing practices, it will abandon its responsibility by allowing the commercial decisions of the pharmaceutical industry to dictate patient care. As a physician, I do not want to see that happen. As patients or potential patients, we should all resist it. As medical writers, we should guard against permitting regulatory language to creep into our art as expressions with common-language connotations.

Perhaps the commonest and most dangerous ambiguity of the type I have in mind is the frequent reference to "FDA-approved uses" of drugs. Yet, the FDA does not approve uses of drugs once they are on the market! It approves what a manufacturer may *say* about these uses in its advertising and its regulatory monograph.

I hope no one really wants his physician's therapeutic judgment to be supplanted by that of a consortium of the pharmaceutical industry and the federal bureaucracy. All medical writers who do not can contribute some weight merely by being precise with their diction. They should stop writing about such things as "FDA-approved uses" of drugs, or "FDA-approved doses." Instead, if there is any need to mention the matter at all (and usually there is not), they should be accurate and use expressions like "FDA-approved labeling," or perhaps better, merely "uses recommended [or not recommended] in the manufacturer's regulatory monograph."



Announcements

Professional meetings, conferences, and postgraduate courses of national importance are listed for the* Doctor's Calendar. *Notice of the session is posted in advance to allow the physician time to make preparations.

SEPTEMBER

Sept. 5-9 — International Congress of Internal Medicine, Sheraton Boston Hotel, Boston. Write: Thomas A. Warthin, M.D., 4200 Pine St., Philadelphia, Pa. 19104.

Sept. 10-16 — *Clinical Gastroenterology* (postgraduate course), Castle Harbour Hotel, Bermuda. Write: Vernon M. Smith, M.D., 301 St. Paul Place, Baltimore, Maryland 21202.

Sept. 11-12 — 32nd Annual AMA Congress on Occupational Health, Drake Hotel, Chicago.

Sept. 19-21 — American Rhinologic Society Workshops and Seminars in Nasal Diagnosis and Corrective Surgery, New Orleans-Marriott Hotel, New Orleans. Write: Gerald F. Joseph, M.D., 3622 Government St., Baton Rouge, Louisiana 70806.

Sept. 27-29 — 7th National Cancer Conference, Biltmore Hotel, Los Angeles. Write: Sidney L. Arje, M.D., 219 East 42nd St., New York, New York 10017.

OCTOBER

Oct. 14-19 — American Academy of Pediatrics Annual Meeting, Hilton Hotel, New York City. Write: Dept. of Public Information, 1801 Hinman Ave., Evanston, Illinois 60204.

Oct. 24-26 — American College of Chest Physicians Scientific Assembly, Convention Complex, Denver. Write: ACCP, P. O. Box 93884, Chicago, Illinois 60690.

Oct. 30-Nov. 1 — Omaha Mid-West Clinical Society, Hilton Hotel, Omaha. Write: Mary E. Pilloud, Executive Secretary, 1040 Medical Arts Bldg., Omaha, Nebraska 68102.

The following medical meetings will be held in Israel during 1972:

Sept. 4-9 — Ninth International Congress (extension), International Academy of Pathology.

Sept. 25-29 — International Workshop on Medicine.

Oct. 9-13 — International Congress of Orthopedic Surgery and Traumatology.
Second International Belinson Symposium on the Various Faces of Diabetes in Juveniles.

For meeting and travel information, write: Israel Government Tourist Office, 5 South Wabash Avenue, Chicago 60603.

POSTGRADUATE EDUCATION

University of Colorado:

July 17-21 — *Internal Medicine* (Estes Park, Colorado)

July 17-21 — *Perinatal Medicine* (Snowmass-at-Aspen, Colorado)

July 20-22 — *Cancer of the Digestive Tract* (Aspen, Colorado)

July 30-Aug. 2 *Pediatrics* (Aspen, Colorado)

For further information write the Office of Postgraduate Medical Education, University of Colorado School of Medicine, 4200 E. Ninth Ave., Denver 80220.

American College of Chest Physicians:

Sept. 21-23 — *Coronary Artery Disease* (Mt. Sinai School of Medicine, New York City)

Oct. 5-6 — *Ventricular Function* (Santa Barbara Heart and Lung Institute, Santa Barbara, Calif.)

For information write: Arnold Harris, 112 E. Chestnut St., Chicago, Illinois 60611.

TEST YOUR KNOWLEDGE OF GOLF

Whether you're a duffer or a golfing ace—or simply bound by ties of friendship or family to an ardent golfer—you may find it fun to check your knowledge of the game against these questions and answers compiled by the makers of U. S. Royal golf equipment. See what golfing lore you can bring to the fore—after all, when else in your golfing experience will a high score win?

Where does the word "golf" come from?

Some experts say the word derived from the Dutch *kolf,* or club, others maintain it comes from the Scottish *gouf,* a blow with the hand. Take your pick.

How early did golf become popular?

As far back as 1457, it was such a rage in Scotland that King James II became alarmed—lest golf replace archery, considered essential for national defense. Accordingly, the Scottish Parliament passed a law directing that "futeball and golfe" be utterly cryed downe and nocht uset."

Were 18 holes always used?

No. One of the earliest links, at Leith, had five holes played three times, North Berwick and Blackheath had seven and the famous St. Andrews originally had 12, played out and in, making a total of 22. Finally, by general agreement, the number was fixed at 18.

What is a golf links?

Contrary to popular belief, it is not a golf course, but a stretch of sandy land bordering the ocean, usually left by the receding sea. In its early days, golf was almost always played on links.

What are the oldest and the newest golf balls known?

Prior to 1848, golf balls were of leather, stuffed by means of a special tool with "as many feathers as a hat will hold." Gutta percha balls followed; then the rubber-cored ball, invented in 1898, made new driving distances possible. Two of the newest developments in golf balls are the thin wall liquid silicone center for quick response, and a stain- and scuff-resistant finish said to "lock in" whiteness for the life of the ball.

What is the biggest mistake made by most golfers?

According to Leo Diegel, considered one of the all-time great iron players, it's incorrect position at the top of the backswing. His advice: don't let your left shoulder follow your hands back. Your arms should be just a little short of extended, and semi-relaxed. So slow on the backswing, for best rhythm and timing.

Before you take that swing, remember that the biggest mistake made by most golfers is incorrect position at the top of the backswing. Don't let your left shoulder follow your hands back. Your arms should be just a little short of extended, and semi-relaxed. Go slow on the backswing.

What's a divot?

When an iron shot from the fairway digs up the grass, roots and all, the misplaced piece of turf is called a divot. You or your caddy should put it back into place, tramping it down well with the foot.

Did anyone ever make a drive in excess of a quarter-mile?

Yes. Way back in 1913, E. C. Bliss, playing the ninth hole of the Old Course, Herne Bay, England, whacked a 445-yarder! Several other freak drives have exceeded 400 yards—but in long-driving contests, at sea level, 290 yards is generally the maximum.

Where is the world's most difficult golf course?

Most golfing experts would award the palm to the Pine Valley course in New Jersey. Built in 1912, it boasts the world's biggest bunker or trap: Hell's Half Acre, on the seventh hole.

What are some of the quality features to look for in a set of golf clubs?

Some woods have a special finish to seal out moisture; heads made of bonded sheets of maple will not split, crack or warp. A process called Microbalancing insures that the shaft of an iron will match its head weight, giving a uniformity of weight that smooths the swing.

When a ball is hit out of the fairway, can you remove a branch lying in your path, or a clump of tall grass?

You can remove the branch because it's dead matter—but the grass must remain in place, and so must growing bushes or roots.

Who made the most holes-in-one?

The greatest number of holes-in-one in a golfing career is 25 by C. T. Chevalier.

What was the youngest and the oldest age at which anyone hit a hole-in-one?

The youngest golfer recorded to have shot a hole-in-one was Peter Toogood, aged 8! One T. S. South also performed the feat at the age of 91! It's not too late.

What's the highest score ever recorded for a hole in a professional tournament?

This is perhaps the most important statistic in the whole story, one that you should commit to memory or clip out and show to a golfer you know. It will make him (or you) feel better for years to come. Here it is: a cool 23 for the 17th by the 1927 America Open Champion T. D. Armour in the Shawnee Open Championship of that year.

Letters to VOX DOX should be addressed to the Vox Dox Editor, Journal of the Kansas Medical Society, 1300 Topeka Avenue, Topeka, Kansas 66612.

Gastric Ulcer

(Continued from page 365)

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7. Merendino, K. A.: The jejunal interposition operation for substitution of the esophago-gastric sphincter: present status. *Surgery* 44:1112, 1958.
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9. Clarke, J. M.: Experience with the Thal and Nissen operations in the treatment of reflux esophagitis with stricture: a preliminary report. *Amer. Surg.* 35:89-94, 1969.
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Etiological Variables

(Continued from page 377)

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AMA House of Delegates

(Continued from page 382)

its accuracy by his signature. By assisting in the procedure, the partner would share the professional responsibility of its performance, and his signature validates the accuracy of the report."

Resolved, That the AMA commend the JCAH for modifying its Bulletin No. 62 so as to clarify situations where it is essential that a physician sign the medical record for each act for which he is responsible and those where it is permissible for partners to sign for each other.

They similarly asked the JCAH and the medical society to mutually collaborate to the fullest extent in evaluating medical staff activities.

The House approved the work of the Committee on Private Practice and requested them to continue.

On Venereal Disease

Resolved, That the American Medical Association act in conjunction with appropriate governmental agencies in promoting a program of venereal disease control; and be it further

Resolved, That the American Medical Association promote effective public education and encourage research on production of an effective vaccine against venereal diseases.

They approved the eventual total separation of the House of Delegates from the dates of the scientific assemblies.

Recommended were innovative programs, such as community hospital training affiliation with medical schools.

Opposed were the requirements of physicians under the Occupational Safety and Health Act.

LUCIEN R. PYLE, M.D., Topeka
JOHN C. MITCHELL, M.D., Salina
AMA Delegates

Woman's Auxiliary

. . . *Annie goes to the AMA in San Francisco*

Lots of things have been said and lots of songs written about San Francisco, from "Everything's Up to Date in San Francisco" . . . no, that's Kansas City, isn't it? Well anyway, there's "I lost my heart in San Francisco," and "San Francisco open your golden gates," . . . and probably countless others that never made the Hit Parade. Those aren't the exact titles, but you get the idea.

In spite of all the things that have been sung, said or written, San Francisco remains a mystery, a magical city that simply can't be defined. It's sort of like stepping into a chapter of Alice in Wonderland, or anyhow into a travelog. White fleecy clouds float above an azure bay under an equally azure sky. That is, if they aren't surrounded with a wispy, eerie fog. Cable cars chug to the top of roller-coaster hills and passengers grab a deep breath before taking the plunge downhill. Flower stalls dot the corners, and shops with merchandise from all over the world display their wares in gleaming windows that vie for the visitors' attention. It doesn't make any difference what you look for in San Francisco, you'll find it.

Union Square swarms with people taking their ease in the lush green grass, sitting on benches reading, or just feeding the pigeons. Traffic and pedestrians swarm around them but they all keep doing their thing, whatever it is, playing musical instruments, dancing on the sidewalk, reading, or making love.

When Annie told her youngest that the AMA was to be in San Francisco, she said "Wow! What a way to go!" And it was. AMA conventions are always nice. It doesn't make any difference where they are. If you don't see old friends, you make new ones. You come home from the meeting so chock-full of information that you think you will burst. We came home full of food, too, for there isn't a single type of foreign or domestic food that you can't find somewhere in San Francisco.

Other nice things happened. Since this is the year of the 50th Anniversary of the Auxiliary, the women were invited to attend the opening session of the AMA House of Delegates. This is the first time we have ever been allowed to go. Talk about fanfare! They didn't leave the Auxiliary out, either, for a dramatic visual multimedia presentation of films and slides featured the first 50 years of Auxiliary work. We're getting mighty important when they feature us at their meetings.

Following this program, a champagne reception honored the national president and president-elect. Both Mrs. G. Prentiss Lee, national president, and Mrs. Robert Beckley, president-elect, are blondes. Annie doesn't know if blondes really have any more fun than anyone else, having been a sort of a redhead all her life, but she does know that these two blondes have done a wonderful job the last several years. For that matter, one couldn't really say that any of our national officers have had what you'd call a "little old lady" image. Even the ones with salt and pepper or snow-white hair have a gleam in their eye and enthusiasm in everything they do. No rocking chairs for them.

Monday began the business sessions and these continued through Wednesday, with time off for special luncheons and speakers. Art Linkletter spoke at the Monday luncheon. His subject, "Changing Patterns in Drug Abuse," concerns us all. Wesley W. Hall, M.D., AMA president, brought greetings to the ladies, as did John M. Chenault, M.D., president of AMA-ERF. Dr. Chenault is the husband of a very beloved past-president, Belle, who also takes AMPAC and AMA-ERF seriously. Dr. Chenault made awards to auxiliaries whose contributions to the foundation have been outstanding.

Jean Cavanaugh and the Kansas Auxilians did themselves proud this year in AMA-ERF contributions. They managed to total up a $10 or more contribution per capita Auxiliary membership. An award of merit was given to the Kansas representative at the Monday awards luncheon.

The Tuesday luncheon featured a fashion show of Oriental wear. Talk about sexy! And they're all the thing this year too, so Annie rushed right out to buy her new evening dress.

One could go on and on about all the things we did. The Napa Valley wine tour was routed through Marin, Sonoma, and Napa counties across the Golden Gate Bridge. Lunch was served in the delightful gardens of the Charles Krug Winery. Annie and the rest got to see an informal showing of the world-famous sheepskin coats from the Sawyer Tannery at Napa. A tour of nine wineries included a tasting party at the Robert Mondavi Winery. Samples of wines from each of the wineries visited were included, as well as dessert cheeses. There also was a display of candles and paintings done by well-known Napa Valley artists.

The kids weren't left out either. There was a list of things to do: a boat cruise of the Bay and a tour of the sailing Ship Balclutha, the Wax Museum, the Frontier Village Amusement Park, and Marine World were all on their three-day agenda.

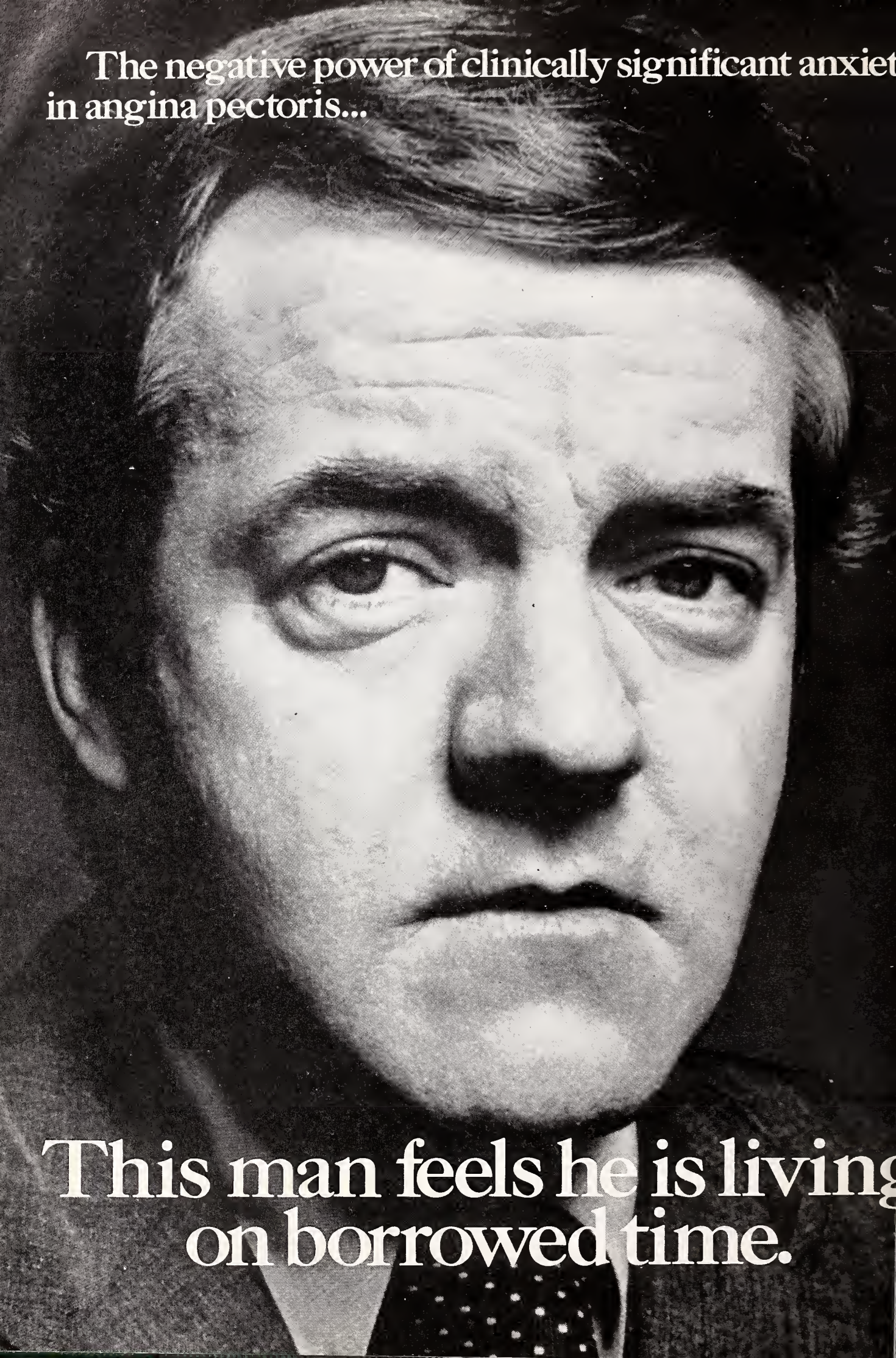
We all had a wonderful time . . . especially on the wine tour. Gotta excuse me now . . . I have to take something for these hiccups. . . .

Auxiliary Annie

THE Journal OF THE Kansas Medical Society

SEPTEMBER
1972

VOL. LXXIII
NO. IX


The negative power of clinically significant anxiet
in angina pectoris...
This man feels he is living
on borrowed time.

During anginal attacks, patients may suffer intense apprehension. More frequently, however, they experience a continuing sense of less severe but nonetheless disproportionate anxiety.

Reduction of such clinically significant anxiety is important, since undue emotional stress may precipitate further anginal episodes.

Adjunctive Librium (chlordiazepoxide HCl) may be especially suitable for relief of clinically significant anxiety and emotional tension in anginal patients because of its generally prompt therapeutic effectiveness and wide margin of safety. In a recent double-blind randomized study,* Librium (chlordiazepoxide HCl) was administered for relief of moderate anxiety in 20 anginal patients seen in office practice over a 20-week period. Symptoms of emotional distress related to anxiety were rated at base-line, one week, two weeks and monthly thereafter. Relief was obtained notably early in therapy. The clinical results demonstrated that Librium offers the coronary patient an antianxiety drug that, in the author's opinion, is both effective and safe. In general use, the most common side effects reported have been drowsiness, ataxia and confusion, particularly in the elderly and debilitated. (See summary of prescribing information.)

Librium (chlordiazepoxide HCl) is used concomitantly with certain specific medications of other classes of drugs, such as cardiac glycosides, diuretics and antihypertensive agents, whenever anxiety is clinically significant. The drug should be discontinued after anxiety has been reduced to appropriate levels.

The positive power of adjunctive Librium® (chlordiazepoxide HCl)

10-mg, 25-mg capsules up to 100 mg daily

for moderate to severe anxiety accompanying angina pectoris

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Relief of anxiety and tension occurring alone or accompanying various disease states.

Contraindications: Patients with known hypersensitivity to the drug.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. As with all CNS-acting drugs, caution patients against hazardous occupations requiring complete mental alertness (*e.g.*, operating machinery, driving). Though physical and psychological dependence have rarely been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage; withdrawal symptoms (including convulsions), following discontinuation of the drug and similar to those seen with barbiturates, have been reported. Use of any drug in pregnancy, lactation, or in women of childbearing age requires that its potential benefits be weighed against its possible hazards.

Precautions: In the elderly and debilitated, and in children over six, limit to smallest effective dosage (initially 10 mg or less per day) to preclude ataxia or oversedation, increasing gradually as needed and tolerated. Not recommended in children under six. Though generally not recommended, if combination therapy with other psychotropics seems indicated, carefully consider individual pharmacologic effects, particularly in use of potentiating drugs such as MAO inhibitors and phenothiazines. Observe usual precautions in presence of impaired renal or hepatic function. Paradoxical reactions (*e.g.*, excitement, stimulation and acute rage) have been reported in psychiatric patients and hyperactive aggressive children. Employ usual precautions in treatment of anxiety states with evidence of impending depression; suicidal tendencies may be present and protective measures necessary. Variable effects on blood coagulation have been reported very rarely in patients receiving the drug and oral anticoagulants; causal relationship has not been established clinically.

Adverse Reactions: Drowsiness, ataxia and confusion may occur, especially in the elderly and debilitated. These are reversible in most instances by proper dosage adjustment, but are also occasionally observed at the lower dosage ranges. In a few instances syncope has been reported. Also encountered are isolated instances of skin eruptions, edema, minor menstrual irregularities, nausea and constipation, extrapyramidal symptoms, increased and decreased libido—all infrequent and generally controlled with dosage reduction; changes in EEG patterns (low-voltage fast activity) may appear during and after treatment; blood dyscrasias (including agranulocytosis), jaundice and hepatic dysfunction have been reported occasionally, making periodic blood counts and liver function tests advisable during protracted therapy.

Supplied: Librium® Capsules containing 5 mg, 10 mg or 25 mg chlordiazepoxide HCl. Libritabs® Tablets containing 5 mg, 10 mg or 25 mg chlordiazepoxide.

*Levine, S.: "Angina Pectoris and Emotional Overlay," Scientific Exhibit presented at the Annual Meeting of the Maine Medical Association, Kennebunkport, Me., June 13-15, 1971.

A copy of the Levine study may be obtained from your Roche representative.

ROCHE

Roche Laboratories
Division of Hoffmann-La Roche Inc.
Nutley, N.J. 07110

Volume LXXIII, Number 9—September, 1972

The JOURNAL of the KANSAS MEDICAL SOCIETY

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Address all correspondence to the JOURNAL OF THE KANSAS MEDICAL SOCIETY, 1300 Topeka Avenue, Topeka, Kansas 66612.

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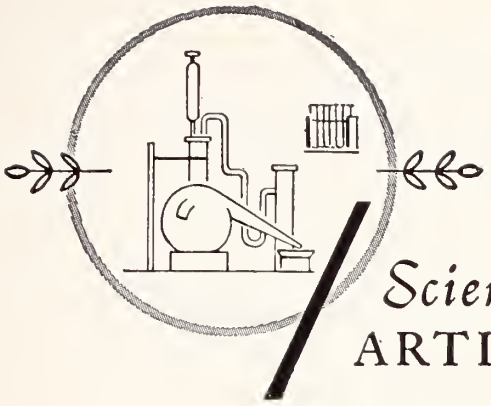
Annual Issue

Kansas Chapter American College of Surgeons

Printed in this issue are five of the papers presented at the annual meeting of the Kansas Chapter, American College of Surgeons, held in Emporia on October 24, 1971.



Scientific
ARTICLES

Hypoglycemia

Insulin Producing Tumor of the Pancreas

GEORGE J. FARHA, M.D., F.A.C.S.* ***and***
JOSEPH K. ROBERTSON, M.D.,† ***Wichita***

Eight surgically treated cases of functional islet cell tumor of the pancreas are tabulated. The authors discuss symptomatology and the importance of physician's awareness in recognizing this entity. Fulfillment of Whipple's triad plus a prolonged fast confirming organic hypoglycemia are considered the most significant diagnostic criteria. The surgical treatment remains enucleation or distal pancreatectomy. Pancreaticoduodenectomy is rarely, if ever, indicated.

INSULIN PRODUCING tumor of the pancreas is an uncommon but well established endocrine abnormality. Its protean symptomatology and the failure of the physician to consider it in his differential diagnosis may lead to delay and possible errors in treatment. Surgical extirpation, when benign adenoma is found, is a safe and curable procedure. The infrequent occurrence of this complex entity in one physician's practice, and the belief that more awareness of its existence is needed, prompted us to relate experiences with eight cases managed at St. Francis Hospital, Wichita, Kansas. In addition, a modest review of the literature is presented.

History

In 1869, Langerhans described the pancreatic islet cells; however, in 1893, Langerhans' student, Laguesse, named them Islets of Langerhans, after his professor.[29]

Nichols,[25] a pathologist, described the first islet cell adenoma in 1902. At that time, however, insulin had not been discovered and the function of these tumors was quite obscure. In 1922, Banting and Best[2, 3] observed the hypoglycemic effect of insulin. In 1924, Harris[14] postulated the concept of hyperinsulinism.

The first operation upon a patient with a functioning islet cell tumor was performed by W. J. Mayo in 1927; however, the patient had adenocarcinoma and expired.[33]

In 1928, Finney[32] operated upon a patient without alleviation of symptoms after resection.

The first surgical cure, performed in 1929, was credited to Roscoe Graham.[16] Best tested extracts from that tumor and demonstrated its insulin effect on mice.[16]

In 1935, Whipple[32] reviewed the subject and reported on the classic symptoms comprising Whipple's triad.

Significant advances were made in the ensuing years, particularly with improved diagnostic methods. Fajans[8] in 1959 described the use of tolbutamide as a tool in the diagnosis. Yalow and Berson,[35] in 1960, complemented this study by reporting a sensitive method for the immunoassay of insulin.

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TABLE I

SUMMARY OF CASES AT ST. FRANCIS HOSPITAL

Patient	*Age and Sex*	*Duration of Symptoms*	*Lowest FBS MG %*	*Whipple Triad*	*Location Size (cms)*	*Single or Multiple*	*Operative treatment*	*Pathology*	*Result*
1	31 M	6 mos	21	+	Tail 1 cm	Single	Distal pancreatectomy	Benign adenoma	Cured 8 yrs follow-up
2	57 M	20 yrs	39	+	Body 2 cm	Single	Distal pancreatectomy cholecystectomy	Benign adenoma	Cured 3 yrs follow-up
3	44 M	3 yrs	40	+	Junction of body and tail 2 cm	Single	Distal pancreatectomy	Benign adenoma	Cured 2 yrs follow-up
4	54 F	1 yr	52	+	Head 1.5 cm	Single	Enucleation	Benign adenoma	Cured 2 yrs follow-up
5	60 M	20 yrs	33	+	Body 2.5 cm	Single	Enucleation	Benign adenoma	Cured 6 yrs follow-up
6	55 M	1½ yrs	21	+	Head 2.5 cm	Single	Enucleation distal pancreatectomy	Benign adenoma	Cured 4 yrs follow-up
7	56 F	1 yr	35	+	Tail 1½ cm; body 1 cm	Multiple	Distal pancreatectomy	Benign adenoma	Cured 5 yrs follow-up
8	66 F	6 mos	40	+	Body and tail—large mass	Single	Biopsy of pancreas and liver	Islet cell adeno-carcinoma with metastasis	Died 4 mos later

Clinical Material

During the past ten years, eight patients have undergone exploratory laparotomy with a presumptive diagnosis of organic hypoglycemia at St. Francis Hospital *(Table 1)*. Single benign adenomas were found in six patients. Two separate adenomas were present in one patient and one had an islet cell adenocarcinoma with metastasis to the liver. The tumor in two patients was located in the head of the pancreas posteriorly, whereas the remaining six were found in the body and tail. All eight cases presented with a positive Whipple's triad. Only four of the eight patients had a tolbutamide test and all were positive. Concomitant immunoreactive insulin (IRI) levels were performed in one patient with greater than 150 Mu insulin present. No operative mortality occurred in this small series. One patient developed a left subphrenic abscess, which required drainage, with subsequent recovery. Four patients underwent distal pancreatectomy. One patient had distal pancreatectomy with enucleation and two patients had enucleation alone. One patient had biopsy of the tumor and biopsy of the liver only. All but one of these patients are living and well two or more years postoperatively. The one patient expired four months after surgery with liver metastasis. The fasting blood sugar in six of the seven patients who were cured stabilized at 100-120 mg four weeks after surgery. However, only one patient had blood sugar of 140-150. Duration of symptoms in these patients varied from six months to twenty years. Their ages ranged from 31 to 66 years, with an average of 53 years. *Table 2* shows a collective review of the characteristics of islet cell tumors.

TABLE II

CHARACTERISTICS OF FUNCTIONAL ISLET CELL TUMOR

Sex	Male-Female
Age average	25-55 years
Size—average	1-2.5 cm
Histologically malignant	20%
Malignant with metastasis	10%
Benign	70%
Locations	
1. Body, neck, and tail	75%
2. Head	25%
3. Ectopic	2%
4. Multiple	12%

Diagnostic Considerations

Clinical Evaluation. Manifestations produced by insulinoma may easily be overlooked because of the frequency of sympathetic discharge associated with other more common problems. These symptoms are evident by diaphoresis, hunger, flushing, nausea, tachycardia, trembling and apprehension, which are initiated by hypoglycemia induced by hyperinsulinemia.

Variable individual responses and the sensitivity to insulin influence the degree of reaction. These episodes may develop acutely but more frequently are chronic in nature. Patients may frequently present with central nervous system abnormality manifested by organic and behavioral symptoms, which may have resulted in psychiatric treatment. It is because of the bizarre symptomatology that insulinoma may not be recognized early.

One must be certain to eliminate non-surgical causes of hypoglycemia since, once the diagnosis is suspected strongly, laparotomy is indicated. Consequently, liver diseases presenting primarily with glycogen depletion and resultant hypoglycemia in the presence of stressful precipitative conditions must be ruled out through appropriate tests, *i.e.,* alcohol induced hypoglycemia.[31] Diseases presenting with hormonal deficiency, *i.e.,* hypopituitarism (growth hormone, ACTH), Addison's disease (glucocorticoids), hypothyroidism, catecholamine deficiency, and glucogen deficiency must be considered and eliminated as causes. Large neoplastic growths (sarcomas, etc.) and other more frequent offenders presenting with hypoglycemia, such as early diabetes and dumping syndrome, must be recognized. Leucine sensitivity must be considered. Other more obvious causes, such as starvation, excess losses and excess utilization (fever, neoplasm, exercise) will be easily recognized.

Drug administration must be considered early as a cause. Fortuitously induced insulin overdose hypoglycemia may be a responsible factor. Other agents, such as sulfonylureas prescribed in borderline diabetes mellitus, may produce prolonged severe hypoglycemia.

Frequently, in patients who have been symptomatic for longer periods, obesity is present. Repeated episodes of hypoglycemia relieved by ingestion of food leads these patients to dietary habits which are necessary to prevent the attacks.

All of our patients presented with Whipple's triad,[32] which is characterized by symptoms of hypoglycemia, blood sugars below 50 mg per cent, and reversal of symptoms by administration of glucose.

Other than a reported higher incidence of insulinomas associated with Werner's syndrome (multiple endocrine tumors), no characteristic features or disease appear related. Islet cell adenoma and islet cell hyperplasia may only be differentiated by laparotomy.

An accurate history is a prerequisite to a systematic thorough investigation, which should be employed in addition to the more specific studies indicated later.

Laboratory Studies. Liver function tests are definitely indicated to further evaluate hepatic factors or to rule out possible metastatic disease.

Specific adrenal function studies should be per-

formed when indications warrant. The physician usually suspects the possibility of these processes more commonly from the history, but may be led to consider them from a low or borderline low fasting blood sugar, although the fasting blood sugar is frequently within normal range, depending upon the glucose stores.

Although some newer methods for diagnosis are available, the prolonged fast (72-hour fast) remains one of the most valuable methods to establish organic hypoglycemia.[12] A fasting blood sugar is obtained and is followed by serial six-hour glucose study. Constant observation is mandatory. Accentuation in the rapidity of hypoglycemia may occur with exercise. The test is discontinued with the onset of severe hypoglycemic symptoms. Functional hypoglycemia is characteristically differentiated by the development of postprandial symptoms two to three hours after food ingestion, which are unaffected by exercise. Two-thirds of the patients with insulinoma will have symptoms after an overnight fast.[1]

The glucose tolerance is usually of no value unless a six-hour test is porformed, which may show a lower blood sugar near the end of the test.[1, 34] It is, however, important in establishing diagnosis of physiologic or alimentary types of hypoglycemia.

The glucagon test[19] is based upon hepatic-glycogenolytic effect, which provokes insulin secretion. It may also be insulinotropic in contrast to epinephrine. One milligram of glucagon is given intramuscularly, and blood specimens are obtained at 15-minute intervals thereafter. With insulinoma there is a normal rise in blood sugar within the first hour followed by rapid hypoglycemic levels. The patients need adequate caloric intake two days prior to the study. A marked increase in serum insulin occurs in insulinoma.

In 1959, Fajans and Conn[8] first reported the use of tolbutamide as an adjunct in the diagnosis of functioning islet cell adenoma. The diagnostic value is based upon the responsiveness of the beta cell to tolbutamide, thus producing insulinemia. This study is valuable in patients with fasting blood sugar in the normal range. The test is conducted by giving the fasting patient a gram bolus of sodium tolbutamide intravenously over a two-minute period, followed by serial blood sampling at 15-minute intervals. Rapid development of hypoglycemia usually ensues in the patient with insulinoma. There is a secondary rise to within normal range one and one-half to three hours after administration, which is due to the counterregulatory mechanisms produced by epinephrine, 11-oxysteroids, glucagon, ACTH and growth hormone. With functioning islet cell tumors, there is a greater degree of prolonged hypoglycemia. In insulinoma a decrease of blood glucose greater than 36 per cent from fasting levels should be noted.[27] Of greater importance is the prolongation of the period of hypoglycemia, rather than the degree.[8, 9] This study is the best method of differentiating organic from functional hypoglycemia.[9]

After 1960, the immunoassay technique utilizing immuno-reactive insulin became available allowing determination of simultaneous insulin levels obtained with the tolbutamide test.[11] Several blood samples for insulin levels are performed at ten-minute intervals for the first 30 minutes, since maximal increments in plasma insulin usually occur with the first 15 minutes after administration of tolbutamide. A level of 150 Mu is considered significant.[34]

Frawley[12] has stated that 90 per cent of patients with insulinomas will have fasting elevated insulin levels; however, McKiddie[20] and particularly Samols and Marks[28] have shown that normal fasting insulin levels are frequently found. They have also shown significant spontaneous fluctuation in the fasting insulin levels.[30]

Cochrane *et al,*[7] in 1956, initially demonstrated the hypoglycemic effect of L-leucine. Yalow and Berson,[35, 36] in 1960, subsequently demonstrated elevated plasma insulin levels after L-leucine ingestion. As a result, leucine sensitivity of insulinomas was demonstrated and is utilized as an additional study in the diagnosis of islet cell tumors. However, leucine does not consistently produce plasma insulin increases.[11] The response, however, is variable and leucine sensitivity by no means differentiates idiopathic hypoglycemia from insulinoma. The mechanism of action has been studied by Flanagan,[10] who indicates that leucine may act by potentiating the peripheral action of insulin. However, the leucine stimulating effect on the beta cells with subsequent insulin release has been more readily accepted.

X-Ray Determination. Chest, gastrointestinal and genitourinary tract radiographic evaluation must be performed. Selective arteriography may be valuable in demonstrating multiple tumors and aiding in their localization.[4, 5, 6, 18, 22]

Olson,[26] in 1963, was the first to demonstrate by angiographic study the presence of an islet cell tumor of the pancreas. Utilizing a simultaneous celiac axis superior mesenteric injection, he demonstrated a 1.5 cm lesion.

The overall value is limited due to the vascular characteristics of these tumors. In general, pancreatic tumors are avascular and detection depends upon indirect signs. Less than 20 per cent of islet cell tumors are vascular enough or large enough to be recognizable or to permit recognition of the localized staining usually noted one to two seconds after injection.

This diagnostic tool, however, has not been consistently reliable, but, as stated, it can be a valuable adjunct. Its prime value will be in demonstrating multiple lesions, as well as ectopic tumors.

Surgical Management

Cure is anticipated following surgical extirpation of the tumor; however, it is dependent upon a number of potential variables. A preoperative diagnosis of insulinoma is a commitment for recommendation of an exploratory laparotomy.

While the majority of lesions are single, multiple lesions are encountered in about 10 per cent of cases.

Howard and Moss[15] review of 398 cases showed a distribution of 25 per cent of lesions in the head, 10 per cent in the neck, and 65 per cent in the body and tail. Ectopic locations, including the splenic hilum, duodenal wall, stomach and posterior pancreatic area, may be noted in less than 3 per cent of the cases. Approximately 10 per cent of lesions are malignant.

Thorough exploration should be performed before definitive surgery is undertaken in order to prevent pitfalls resulting from failure to localize the lesion or lesions. Our Case #6 *(Table 1)* depicts experience with failure to localize a lesion in the head of the pancreas, which was discovered by palpable examination and subsequently enucleated only after performing distal pancreatectomy. The areas of possible ectopic pancreas are examined closely, following complete mobilization of the gland.

A Kocher maneuver is performed following which the gastrocolic ligament is divided in order to visualize the anterior surface of the pancreas. The body and tail are mobilized by incising the peritoneum along the superior and inferior pancreatic borders. Splenic mobilization may be necessary in order to completely palpate and visualize the gland. We feel that the recommended treatment is enucleation or distal pancreatectomy. If the tumor is readily accessible on the exposed surfaces, enucleation may be carried out. With a lesion embedded in the substance of the gland to the left of the superior mesenteric artery, a distal pancreatectomy should be performed.

A glucose infusion at a constant rate should be given intraoperatively, with blood sugar sampling performed periodically. Following removal of functioning islet tissue, McMillan and Scheibe[21] demonstrated elevation of blood sugar within 30 minutes.

Getzen and Sode[13] reported the use of Dextrostix as a rapid method for monitoring the blood sugar level following excision.

Serial analysis during surgery, utilizing the autoanalyzer, has been suggested as a more rapid and accurate method for detection of the rebound hyperglycemia.

In those cases in which no tumor is found at surgery, the general opinion (LaRoche, Howard, Moss and Rhoads[15]) favors blind distal pancreatectomy. Others disagree with this approach.[23, 24]

Fifteen of 33 patients in the LaRoche[17] series who underwent blind resection were found to have occult adenomas. Sixty-three per cent of tumors in their series (154 cases) were located in the body and tail.[17]

Serial progressive excision of the neck may be performed if hyperglycemia rebound is not demonstrated by subsequent serial intraoperative blood sugar determinations. If this is not encountered, the surgeon is then left with the decision of whether to perform pancreaticoduodenectomy, which is rarely if ever indicated.[17]

Howard, Moss, *et al.*,[15] Laroche,[17] and Whipple[32] report a 50 per cent improvement with distal blind resection in the absence of tumor.

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Primary Sclerosing Cholangitis

Presentation of 4 Cases

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PRIMARY SCLEROSING cholangitis is a rare and interesting disease of unknown etiology and of a very serious nature. It is characterized by chronic fibrosis and stenosis of the bile ducts producing various degrees of biliary obstruction. It may involve the extra hepatic ducts and progress to include the hepatic radicles. At operation, the common duct may feel quite hard and fibrotic, and it is difficult to think that one is dealing with any disease other than cancer. This fibrosis may involve the hilus of the liver and the size of the common duct may vary considerably. The lumen of the duct may be only a few millimeters in diameter and the duct may feel like a piece of cord or a fibrosed vein.

The first report of sclerosing cholangitis in the American literature was that of Miller[1] in 1927. In 1964, Holubitsky and McKenzie[2] stressed four diagnostic criteria: (1) No previous surgery on the biliary tract; (2) No stones in the gallbladder or common bile duct at the time of surgery; (3) No carcinoma involving the bile ducts; and (4) A sclerosing process involving all extrahepatic biliary ducts. Manesis and Sullivan[3] include biopsy evidence of inflammation and radiologic criteria. In 1958, Schwartz and Dale[5] reviewed the literature and found only 13 cases reported. Since then, other series have been reported (42 cases) by Warren *et al.*[6] In reporting his series of cases, he did report 15 who had had biliary surgery and 14 with gallstones.

Follow-up study shows that biliary cirrhosis will eventually develop in most of these cases and the persons will die from either liver failure or bleeding esophageal varices, with an average of six years between onset of biliary symptoms and death.[6] Cutler and Donaldson,[8] in reporting eight cases, suggest the use of antihistamine drugs in small doses over a long period of time. They feel that autoimmune factors may play a part in the etiology of the disease. Antigen-antibody reaction may be important. A specific antiserum may be developed to combat it.

Operative cholangiograms have been quite helpful in making the diagnosis and in determining the extent of the disease. The narrowing of the common duct, as well as the limited branches of the intrahepatic radicles, can be readily demonstrated. Decreased arborization of the intrahepatic branches is shown and there may be a "pruned tree" appearance of the radicles. The dye seems to pool in the area of stenosis. The hepatic ducts may have a beaded appearance and the length of the stenosis may vary. There may be focal areas of dilatation.

The pathological picture reveals an intact epithelium with nodular intramural areas of proliferation of epithelial cells. There is usually marked fibrous thickening of the wall of the duct *(Figure 1)*. The gallbladder may be involved. The exact etiology is not known. There have been cases of fibrous retroperitonitis associated with the disease; ulcerative colitis has also been associated with it.[6] Warren reported 12 cases of ulcerative colitis out of his series of 42. Coopersmith and Appelman[9] state there is a basic pathologic similarity among this condition, mediastinal fibrosis, retroperitoneal fibrosis, pseudotumor of the orbit, and Riedel's struma of the thyroid. The majority of patients with the disease are male and over 40 years of age. Alcohol addiction is not related to the disease, but it has been reported in connection with it.

The treatment can be divided into surgical and medical. Once the diagnosis is made, the only surgical procedure to be done is decompression of the biliary tree to protect the liver from further damage. The common duct can be explored and dilated and a T-tube inserted for external drainage. Hepaticojejunostomy or a cholecystojejunostomy have been done. A cholecystostomy may be done if the proximal part of the common duct is involved and the cystic duct is not involved. If a T-tube is inserted, it should be left in and not removed unless it obstructs. The medical treatment is the use of a broad spectrum antibiotic with steroids, however, this treatment should be combined for best results.

The condition is so rare that it probably behooves us to report even single cases. Thus, we wish to report the following four cases.

Case One

A 64-year-old white female was admitted to the hospital on January 27, 1960, complaining of jaundice and pain in the upper abdomen. She had some nausea but no symptoms of acute pain, and she had not developed any fever. She had some indigestion over the past three or four months, and had lost approximately 12 pounds in the last two months. Examination of the abdomen revealed no masses or tender-

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Figure 1. Severe fibrosis and thickening.

ness. The liver and spleen were not palpable. The abdominal wall was quite flabby due to loss of weight, and she was markedly jaundiced. Her prothrombin time was 70 per cent of normal, icteric index 17.8, serum glutamic oxaloacetic transaminase (SGOT) 372, serum glutamic pyruvic transaminase (SGPT) 328. The icteric index went to 33 prior to surgery. She was operated on January 29, 1960, and the gallbladder was found to contain innumerable stones and white bile. It had a very thick and hard wall. The common duct was small between the cystic duct and ampulla. The stenosis of the common duct appeared to be between the liver and the cystic duct. This area was quite hard and appeared to be an inflammatory mass or tumor involving the lower end of the gallbladder and the common duct. No stones were found in the common duct. A biopsy of the hard mass was taken and a frozen section was reported to be benign. A biopsy of the gallbladder wall was also taken; stones were removed from the gallbladder. A cholecystostomy was done because it was deemed inadvisable to remove the gallbladder due to excessive bleeding. A mushroom catheter was placed in the gallbladder. The fibrotic area in the common duct was dilated and a small T-tube was inserted. A penrose drain was inserted down to the area of the biopsy of the common duct and brought out through the lateral end of the incision. A layer closure was done and her postoperative condition was fair. The T-tube functioned very poorly and practically no bile was obtained. The icteric index went higher, and on February 8, 1960 she was re-operated. The common duct fibrotic area was opened further and dilated, and a large #16 T-tube was inserted to extend above the stenosis. The patient withstood this procedure well. Following this, her jaundice cleared and she was dismissed on February 25, 1960. While at home, she did quite well until she accidentally pulled out the T-tube and became jaundiced again. She was readmitted on March 29, 1960 and taken to surgery, where another biopsy of the common duct mass was made and the T-tube reinserted into the common duct through the stenotic area. The biopsy was again reported as fibrous tissue. The patient withstood the procedure well and was subsequently dismissed on April 16, 1960. While at home, she became weaker and more jaundiced. She was readmitted to the hospital and subsequently died of pneumonia. She was extremely jaundiced at the time of her death.

Case Two

A 77-year-old white male was admitted to the hospital on March 12, 1971, complaining of weakness and general malaise. He has considerable itching and his stools were white in color. He was quite jaundiced and had lost very little weight. He stated that in 1934, he had x-rays and was told that he had gallstones, but later he was told that he did not have stones. He had no pain. Examination revealed a markedly jaundiced male, the abdomen revealed a fullness in the right upper quadrant with moderate tenderness. The total bilirubin was 10.5, SGOT 140. On March 16, 1971, he was taken to surgery and it was found that the liver was firm and enlarged. The edge was blunted, there were several enlarged nodes along the common duct, and the common duct was small. The gallbladder was collapsed and thick walled. A hard indurated mass was in the hilus of the liver. The lumen was quite small. The mass of the common duct was biopsied and a frozen section report was benign. The study of a lymph node was also benign. The common duct was explored and found to be open up to the mass. No stones were present. The stenotic area was dilated and a #12 T-tube was inserted. The upper limb went through the stenotic area. The gallbladder was removed and a liver biopsy taken. The pathology report was chronic cholecystitis with stones. The liver revealed cholangitis with cholangiolitis and central bile stasis. A T-tube cholangiogram was done. It revealed irregular filling of the common duct and biliary radicals with no evi-

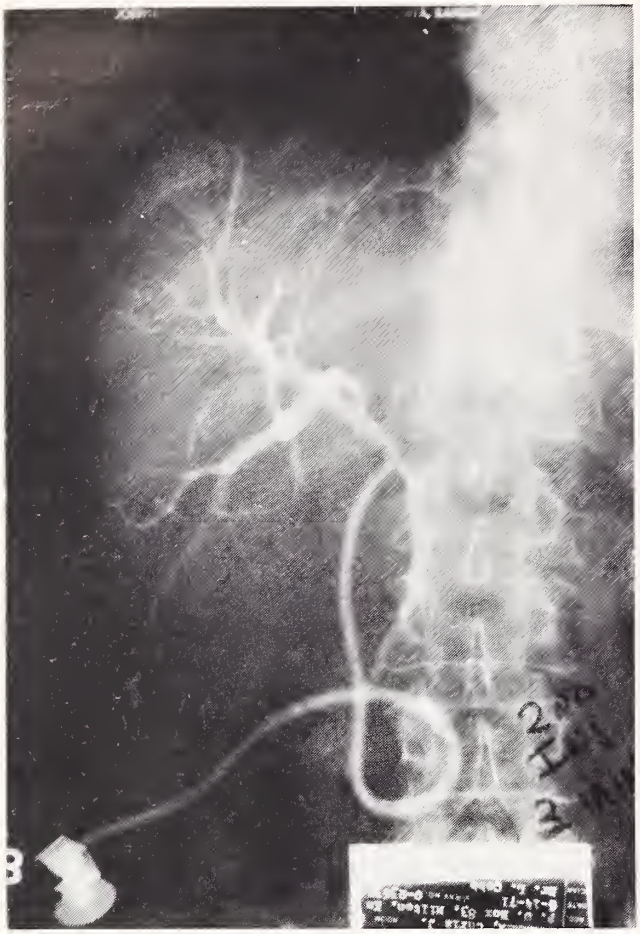

Figure 2. "Pruned tree" effect and blunting of biliary radicals.

dence of dilatation, suggesting sclerosing cholangitis *(Figure 2)*.

Following surgery, the patient was given antibiotics and cortisone (Medrol). His jaundice improved and the stools darkened somewhat. He was dismissed on April 20, 1971. While at home, his jaundice returned and he was repeatedly readmitted to the hospital. He later fell and fractured the right hip, whereupon, transferred to a care home, he died on September 18, 1971.

Case Three

A 35-year-old white female was hospitalized on December 10, 1968, for evaluation and management of migraine headaches of ten years' duration. She had also complained of a generalized pruritus for six weeks prior to admission. Her only medication had consisted of birth control pills. Her physical examination was entirely normal with the exception of slight tenderness elicited to palpation in the right upper abdominal quadrant. There was no mass or visceromegaly clinically appreciated. X-ray studies included cervical spines, skull films and brain scan, as well as echoencephalography. All were negative. A gastrointestinal radiological survey revealed a functioning gallbladder containing multiple calcified stones. A preoperative alkaline phosphatase was normal and her bilirubin was 0.41 total. All of her other blood chemistry studies were entirely within normal limits.

Elective surgery for cholecystectomy revealed several medium-sized multifaceted stones within a thin-walled gallbladder. The most strikingly abnormal finding was a rock-hard common bile duct which could not be compressed. Furthermore, the common hepatic duct and its right and left tributaries were of the same consistency. The cystic duct did not appear to be involved in the sclerosing process and, accordingly, a transcystic duct operative cholangiogram was performed revealing a pinpoint narrowing of the common bile duct through its entirety *(Figure 3)*. There was predominant involvement of the distal 3.5 cm of the common bile duct, with only a 2 mm lumen identified in most areas. Contrast material passed into the duodenum easily and there was no intrahepatic ductal abnormality recognized and no intrahepatic or extrahepatic ductal stones found.

The patient's pathological diagnosis was consistent with chronic inflammatory reaction and fibrosis involving the cystic duct. The common bile duct node revealed follicular hyperplasia only. The gallbladder was consistent with cholecystitis and cholelithiasis.

Figure 3. Narrowing of the common duct.

This patient's postoperative course was entirely uneventful. In view of the extensive involvement of her common bile duct and her lack of symptoms or evidence of any obstructive phenomena, the common bile duct was not explored and no dilatation of the same was entertained. To this date, the patient has remained free of symptoms.

Case Four

A 26-year-old white male was initially admitted to a hospital in June 1969, with episodes of chronically recurring right upper quadrant abdominal pain. His past history was significant in that he had been under treatment for paroxysmal nocturnal hemoglobinuria, and had for two months prior to this admission been treated with halotestin. His preoperative studies revealed gallbladder non-visualization on repeat double dose oral cholecystography; the remainder of his complete gastrointestinal radiological survey was entirely normal. His chemical profile with particular attention to the biliary tract was also unremarkable. He was not anemic and there was no chemical evidence of hyperbilirubinemia. His alkaline phosphatase in particular was also within normal limits.

Elective abdominal exploration during the same hospitalization revealed a thick-walled, chronically inflamed, sub-acute type of cholecystitis. There were no stones within the entire biliary tree, including the gallbladder. The cystic duct was thick-walled and very indurated, and the process extended to involve the entire common bile duct as well as the common hepatic duct and its right and left tributaries. The common bile duct was considered rock-hard. The liver was enlarged and had a granular surface suggestive of early cirrhosis. Following cholecystectomy, an operative cholangiogram was obtained through the thickened but patent cystic duct. This revealed patency of the entire extrahepatic biliary tree. There was a beginning of narrowing of the distal one-third of the common bile duct, particularly within the intrapancreatic portion. The proximal common hepatic duct and the left hepatic duct revealed some dilatation. There was evidence of a "pruned tree" effort involving the intrahepatic radicals.

Ductal carcinoma was ruled out by histologic confirmation of the cystic duct *(Figure 4)*. It was elected not to explore or dilate the common bile duct because of the radiographically confirmed patency of the same. Furthermore, there appeared to be minimal encroachment on the lumen of the same.

The patient's postoperative convalescence was essentially uneventful. One month following his hospital discharge, he was readmitted with massive ascites and jaundice. At that time, a percutaneous liver biopsy revealed early biliary cirrhosis. The patient was unresponsive to diuretics, but did respond dramatically to the administration of steroids with eventual reduction and disappearance of his ascites and clearance of his jaundice. His convalescence was then uneventful. He was eventually given a medical discharge and is doing well at the present time.

Figure 4. Fibrosis with normal mucosa of cystic duct.

Summary

Four cases of primary sclerosing cholangitis have been presented. A general discussion of the disease has been given, pointing out the important diagnostic findings. The pathology and x-ray findings have been discussed and the seriousness of the disease has been emphasized. The types of treatment have been given. It is important that one be on the lookout for this condition, and deal with it accordingly.

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Bladder Replacement

The Ileal Conduit Reappraised

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BLADDER SUBSTITUTION by uretero-enterostomy has intrigued surgeons for years. The most popular method of urinary diversion for many years was ureterosigmoidostomy. However, long-term complications, such as recurrent pyelonephritis, ureteral sigmoid stricture, and electrolyte imbalance were significant. Further, if the patient's rectum and bladder were removed in radical cancer surgery, or the patient had an incompetent rectal sphincter, ureterosigmoidostomy was impossible. In 1908, Verhoogen introduced the use of an isolated segment of ileum and ascending colon as a method of urinary diversion. In 1950, Bricker reported the use of the isolated segment of ileum alone as a method of bladder substitution in patients requiring anterior exenteration for carcinoma. In the early 1960's, several authors reported the surgical mortality to be 10 per cent or greater, and a significant postoperative morbidity. Nevertheless, the procedure has gained in popularity as a method of urinary diversion. This increase in acceptance of the ileal conduit should be based upon better surgical mortality and morbidity. We have, therefore, reviewed our own experience in 127 patients who received an ileal conduit from 1960 to 1970, to determine our current operative mortality and morbidity.

Fifty-five patients underwent a radical cystectomy, 43 of whom had carcinoma of the bladder, and 12 patients with secondary involvement from a regional primary carcinoma. Sixty-five patients required ileal conduit because of a neurogenic bladder with secondary renal deterioration, recurrent infection, and incontinence. Twenty-one patients had acute, acquired, transverse myelitis, and 40 patients were born with myelomeningocele, and had a secondary autonomous neurogenic bladder. Eleven patients required ileal conduit because of multiple sclerosis, bladder exstrophy, etc.

As noted in *Table 1,* the immediate mortality and morbidity was greater for patients requiring cystectomy for carcinoma. Mortality in patients with carcinoma was 6 per cent as compared to 1 per cent in patients with a neurogenic bladder. The difference undoubtedly reflects the more extensive and prolonged surgical procedure required in patients with carcinoma. The incidence of wound complications, such as significant infection and dehiscence, was 20 per cent in patients with carcinoma as compared to 2 per cent in patients without carcinoma. The majority of the patients with carcinoma had received preoperative irradiation, which may also contribute to this difference. The remainder of the immediate postoperative complications were essentially equal in each group. Therefore, the incidence of operative mortality and morbidity was found to be considerably less than initial reports. However, the total of all complications regardless of their significance was 28 per cent.

The ileal conduit introduced by Bricker in 1950, has gained in popularity and is now the preferred method of supravesical urinary diversion. Mortality in patients with carcinoma has been reduced, and in those requiring only a urinary diversion for a neurogenic bladder is approximately 1 per cent. The incidence of complications is acceptable, although still considerable in the patient requiring a radical cystectomy in conjunction with the construction of an ileal conduit. Particular attention to surgical technique will keep immediate and postoperative morbidity low.

In evaluating the long-term mortality and morbidity *(Table 2),* the length of follow-up was an average of four years. Twenty-three per cent of patients with carcinoma died of their primary disease as compared to one patient in the non-carcinoma group, who died of gram-negative sepsis. Therefore, in assessing long-term complications from an ileal conduit, the incidence in the patients with carcinoma might well have been even higher than reported here had all the patients survived. Nevertheless, the incidence of complications was significantly higher in this group. The intravenous pyelogram deteriorated in 9 per cent, as compared to only 4 per cent without carcinoma. Many of the patients with malignancy had hydronephrosis secondary to ureteral obstruction from the primary tumor. Three patients had deterioration secondary to metastatic carcinoma involving the uretero-ileal anastomosis. The remainder appeared to be a progressive degeneration of the already established

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TABLE I

IMMEDIATE MORTALITY AND MORBIDITY (PER CENT)

	55 Carcinoma Patients	*72 Non-Carcinoma Patients*
Mortality	6	1
Wound complication	20	2
Fever	14	10
Uretero-ileal leak	6	5
Stomal ischemia	2	0

Overall Total Complications = 28%

TABLE II

LONG-TERM COMPLICATIONS (PER CENT)

	55 Carcinoma Patients	*72 Non-Carcinoma Patients*
Mortality	23	1
IVP deterioration	9	4
Stones	11	3
Pyelonephritis	5	4
Adhesions	4	3
Stomal stenosis	4	6
Hernia	2	1

Overall Total Complications = 29%

renal disease. The incidence of stones was significantly higher again in patients with carcinoma, and occurred primarily in patients with pre-existing hydronephrosis and pyelonephritis. The overall morbidity and mortality, particularly in the non-carcinoma patients, was again lower than previously reported in the early 1960's. However, when all possible complications regardless of their magnitude or significance were tabulated, the overall incidence was 29 per cent.

The construction of an ileal conduit in conjunction with radical extirpative surgery for carcinoma is a demanding procedure on any surgeon. It is strongly advised that a two-team approach be used, so that a fresh team of surgeons may provide a meticulous approach to the construction of the ileal conduit. The most careful attention to surgical detail is imperative if the immediate and long-term complications of the ileal conduit are to be kept at a minimum. The segment of ileum used for the conduit should be short, reaching only from the sacral promontory to the anterior abdominal wall. It functions as a conduit and not a urinary reservoir. The ileal segment should contain two arcades of vessels to insure adequate blood supply, yet it should reach comfortably to the anterior abdominal wall without tension which might allow venous obstruction. The uretero-ileal anastomosis is accomplished by spatulating the ureters and anastomosing them into the isolated ileum with fine chromic sutures. A single-layer closure is adequate, but a water-tight anastomosis is important. Rarely are ureteral splints necessary.

The selection of the stoma must be done preoperatively, as many patients with skeletal deformity or obesity will not permit placement of the stoma in the classic position between the ileal crest and the umbilicus. Failure to establish the stoma site preoperatively may result in a poorly fitting appliance and secondary stomal complications. We favor an everting stoma as described by Turnbull, as this permits egress of the urine directly into the appliance with minimal skin contact. Approximately six to eight weeks following surgery, the patient should be refitted with another appliance to the smaller, matured stoma. The majority of stomal complications are secondary to a poorly fitting appliance. The second-most common cause is failure to change the bag periodically, and to keep the bag clean. Crystalline deposits upon the internal surface of the appliance can cause stomal excoriation. The appliance must be emptied frequently during the day because, while the conduit may be sterile, the urine in the appliance rarely is. There is free reflux between the conduit and ureter, and a distended appliance filled with infected urine may result in recurrent pyelonephritis.

In summary, the ileal conduit introduced by Bricker in 1950, has gained in popularity and is now the preferred method of supervesical urinary diversion. Mortality in patients with carcinoma has been reduced, and in those requiring only a urinary diversion for a neurogenic bladder is approximately 1 per cent. The incidence of complications is acceptable, although still considerable in the patient requiring a radical cystectomy in conjunction with the construction of an ileal conduit. Particular attention to surgical technique will keep immediate and postoperative morbidity low.

Primary Sclerosing Cholangitis

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Cardiopulmonary Resuscitation

In a Community Hospital

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SINCE ITS INTRODUCTION in 1960 by Kouwhenhoven, closed chest cardiac massage has been proven effective in many cases of cardiac arrest. It has provided circulation adequate to the heart and central nervous system, and has provided the opportunity to bring a defibrillator to the scene if necessary. Originally thought to be best suited to the referral hospital with a large house staff, cardiopulmonary resuscitation is being instituted with success by ancillary medical personnel, so that with training, the small community hospital may now have an accomplished "Code Blue" team without the presence of a physician. Indeed, many resuscitations in the following study were performed by coronary care nurses before a house staff physician could arrive on the scene.

Since introduction of anesthesia and close patient monitoring in 1842, cardiac arrest has been a problem of major concern. In 1858, a case of successful external cardiac resuscitation was reported. Recent improvements in cardiopulmonary resuscitation have been the introduction of direct counter-shock, and more refined use of antiarrhythmic drugs.

In practice, a team for cardiopulmonary resuscitation does exist at St. Francis Hospital. When a cardiopulmonary arrest is discovered, the operator is notified by special code. She in turn notifies an inhalation therapist, an EKG technician, and the house staff officer of the day assigned to Code Blue resuscitations. In the meantime, nursing personnel on the unit immediately begin ventilation with an ambu bag, external cardiac massage, and intravenous fluid, as needed. An anesthetist is on call within minutes. When he arrives on the scene, the house staff member immediately assumes command for the remainder of the procedure. If an IV is unobtainable, a cutdown is immediately performed. If ventilation is inadequate in the early moments of the effort, intubation is performed. The type of rhythm disturbance as indicated on EKG monitor is determined before counter-shock therapy or other cardiac drugs are administered.

Our data comes from cardiopulmonary resuscitation sheets which were filled out immediately following each resuscitation effort by the inhalation therapist present. In addition, all charts of patients with cardiac arrest who either died or survived were retrieved, and were reviewed and examined in detail.

Results

From May 30, 1966, to December 31, 1970, there were 347 cardiopulmonary resuscitations *(Table 1)*. During this period, 232 patients died and 115 were resuscitated. Of the 115 patients who were resuscitated, 77 died before leaving the hospital and 38 left the hospital alive *(Table 2)*. In this study, a successful resuscitation is defined as the regaining of normal homeostasis with respiratory and cardiac function maintained without use of mechanical aids.

In this report, the results of cardiopulmonary resuscitation at St. Francis Hospital in a four and one-half year period from May 30, 1966 to December 31, 1970, have been tabulated with regard to age, sex, time of day, patient location in the hospital, type of rhythm disturbance, primary diagnosis of underlying disease, and primary diagnosis of arrest pathology. The patients were graded with respect to the seriousness of the prearrest state. This study compares these results with those of previous reported literature.

Since this paper includes all types of patients with all degrees of severity of pre-arrest pathology, the patients were categorized into four classes *(Table 3)*. Class I includes a pre-arrest state of good health and generally consists of younger patients. Class II consists of patients who fibrillated. Class III includes patients with asystole but without other lethal pathology. Class IV includes patients with asystole with lethal pathology such as carcinomatosis, severe cerebrovascular accident, chronic obstructive pulmonary disease, and others. As can be seen in Table 3, Class I patients died or recovered immediately. Of the 23 patients in Class I, six did not respond to cardiopulmonary resuscitation. However, of the 17 patients who did respond, all left the hospital alive. In Class

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TABLE 1

Dates	*Total Patients*	*Died*	*Recovered*
5-30-66 to 12-31-66	30	24	6
1-1-67 to 12-31-67	68	45	23
1-1-68 to 12-31-68	86	59	27
1-1-69 to 12-31-69	74	48	26
1-1-70 to 12-31-70	89	56	33
Total	347	232	115

TABLE 2

115 Survivors
77 Died before leaving hospital
38 Left hospital alive

II, there were 103 patients, 69 of whom died immediately. Twenty-two of these patients were resuscitated but died without leaving the hospital, while 12 left the hospital alive. Our results become less satisfactory in Class III, where out of 153 patients, only nine left the hospital alive. In Class IV, the outlook was quite different. Out of 126 patients, even though there were 13 initially successful resuscitations, no one left the hospital alive.

Location of Arrest

There were 80 arrests on the surgical floors, with six long-term survivals, while on the medical floors there were 184 arrests with only 18 leaving the hospital. In pediatrics, 34 arrests occurred and four patients left the hospital. From special care units, namely special postanesthetic recovery, intensive care, coronary care, obstetric-delivery, ten patients left the hospital. Of the patients who suffered cardiac arrest in the special care units, 20 per cent survived *(Table 4)*.

Time of Arrest

There were more arrests on the day shift than on either of the two remaining shifts *(Table 5)*. This may be somewhat influenced by the fact that patients are observed more closely with more personnel being in attendance. With the lower number of cardiopulmonary resuscitative efforts being attempted on the 11 to 7 shift, this might be indicative of the fact that patients are diagnosed in a later state of their arrest, and more hesitancy to call a crash cart exists on the part of the nurse.

TABLE 4
LOCATION OF ARREST

	Surgical	*Medical*	*Pediatrics*	*Special Care*
Number	80	184	34	49
Survival	6	18	4	10
Per cent survival ..	7.5	10.2	11.6	20.4

TABLE 5
TIME OF ARREST

	Number	*Gross*	*Per Cent*
7-3	162	51	31.4
3-11	123	43	34.9
11-7	62	21	33.8
Total	347	115	

Table 6 delineates the primary disease process. It also shows a greater percentage of successful resuscitations in the postoperative surgical patients than in the chronically ill medical patients. The risk is especially poor for those medical patients who have an increased propensity for hypoxia and anoxia such as pulmonary emboli, chronic obstructive pulmonary disease, myocardial insufficiency, pneumonia, or metabolic imbalances such as pancreatitis and septicemia.

TABLE 3

Grades of Patients	*Total*	*Gross Survival* DIED	RECOVERED BUT DIED	LEFT HOSPITAL
Class I—Pre-arrest	(23)	6	0	17
Class II—Fibrillation	(103)	69	22	12
Class III—Asystole without lethal disease	(153)	102	42	9
Class IV—Asystole with lethal disease	(126)	113	13	0
Total		290*	77	38

* Some patients resuscitated more than one time.

TABLE 6

	Total Arrests	*Resuscitated But Died*	*Left Hospital*
MI	112	26	3
CHF	58	10	4
COPD	31	3	1
Postoperative surgery	52	9	12
Cardiovascular accident	26	5	0
Uremia	5	2	0
Carcinoma	16	8	1
Seizure	4	0	3
Drug Rx	4	0	4
Amino fluid embolism	1	0	1
Diabetes complication	8	0	3
Pneumonia	10	5	2
Heart block	4	0	2
Pancreatitis	7	1	1
Sepsis	9	2	1
Multiple trauma	4	2	0
Pulmonary embolism	12	4	0
Total	363*	77	38

* More than one entity in some patients.

Discussion

In this series, all arrests occurring in the operating room or in the emergency room were excluded because a physician was in attendance in these cases at the time of arrest and, consequently, we did not wish to bias this series by putting these special circumstances into it.

Brain damage in resuscitated patients could not be determined from the charts available.

It is quite apparent that the stage of arrest is quite important with the best results being observed in those patients who are detected earlier. Therefore, one should make an effort to encourage nursing personnel to summon help even in the pre-arrest state, since as the patient progresses from the pre-arrest state into ventricular fibrillation and on into asystole, the prognosis steadily worsens.

Table 7 is simply a comparison of our series with several recently reported series, and indicates generally what is being accomplished with cardiopulmonary resuscitation efforts. When we deleted the Class IV patients from the series, our salvage percentage rose to 16 per cent. This may point to a need for being somewhat selective in the patients on whom we institute a resuscitation attempt.

TABLE 7

SUMMARY OF 2,805 CARDIAC ARRESTS OCCURRING OUTSIDE THE OPERATING ROOM

Series	*Patients*	*Discharged Alive*	*Per Cent Discharged Alive*
Jude *et al.*	224	35	15.6
Saphir	123	12	9.8
Himmelhoch *et al.*	63	2	3.2
Stemmler	103	5	4.9
Jung *et al.*	100	20	20.0
Jeresaty *et al.*	237	52	21.9
Johnson *et al.*	552	82	14.9
Hollingsworth	368	30	8.2
Chow	68	9	13.2
Smith and Anthonisen	254	40	15.7
Benfield and Hickey	84	10	11.9
Clarkson	76	8	10.5
Brown (KUMC)	206	34	16.5
Present series	347	38	11.0

Summary

In cardiac pulmonary resuscitation it is important to once again stress the importance of: (1) adequate airway, (2) proper ventilation, (3) restoration of circulation, (4) determination of cardiac rhythm, and (5) the administration of the appropriate medications and electroshock therapy. In our series, the most commonly used drugs were sodium bicarbonate and epinephrine.

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Thoracic Outlet Syndrome

Trans-Axillary Resection of the 1st Thoracic Rib

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THE NORMAL ANATOMY of the shoulder girdle requires that the axillary vessels and brachial plexus pass out of the thorax in close relationship with the superior surface of the first rib and inferior surface of the clavicle between the anterior and medial scalene muscles. Any factor that changes these relationships, such as cervical rib, poor posture and anatomical anomaly of either the 1st rib or clavicle, can and often does contribute to a compression syndrome.

Prior to 1958, when the term "thoracic outlet compression syndrome" was coined by Rob and Sandever,[3] there were numerous compression syndromes of the shoulder girdle recognized. Each was named by the structure involved and the diagnosis of each syndrome involved a physical maneuver, such as scalenus anticus, costoclavicular, hyperabduction, etc. Since the various syndromes all involved vascular or neural compression at the thoracic outlet and were often combined, the diagnosis was very often confused and the treatment gave unpredictable results. This was as high as 50 per cent poor results with division of the anterior scalene muscle for scalenus anticus syndrome.[2]

Methods

Each patient here reported was carefully examined at repeated intervals and was treated conservatively for at least four weeks with exercises, weight reduction, and physical therapy to improve the anatomic relationships of the shoulder girdle. Each patient was offered operation only after failure of conservative therapy. Preoperative evaluation included a chest x-ray, routine cervical spine x-rays, and repeated examination of the involved extremity during the shoulder girdle maneuvers. No angiography or nerve conduction time studies were done, since in each case the diagnosis was felt to be conclusive by physical examination plus history and a positive physical maneuver.

Each of our patients was treated eventually by transaxillary resection of the 1st thoracic rib in the manner described by Roos.[4]

Results

Our earlier experience with thoracic outlet syndrome included two patients who appeared to have pure classic scalenus anticus syndrome without cervical rib (Patients #2 and #4). Each was treated unsuccessfully with supraclavicular division of the anterior scalene muscle. This experience, plus the reports by Roos,[4, 5] prompted us to proceed to transaxillary resection of the 1st rib. We are here reporting a total of seven ribs removed in six patients, all transaxillary. Six of the seven cases were seen predominantly for signs of arterial insufficiency. One of the seven cases presented predominantly neurologic symptomatology (Patient #5). The cases reported here are admittedly of short follow-up, the longest being one year (Patient #1), and the shortest being four weeks (Patient #6). One patient left our area one month postoperatively, but was asymptomatic and with negative physical examination. All seven cases are either markedly improved or completely asymptomatic. All show negative physical examination results for vascular or neural compression at the thoracic outlet and are, therefore, classified as excellent results. The only complication encountered was transient numbness of the medial aspect of the arm due to operative trauma to the intercostal brachiocutaneous nerve *(Table 1)*.

Discussion

The significance of compression of the neurovascular bundle at the thoracic outlet in producing symptoms in the neck, shoulder, and arm has been greatly misunderstood. The fact that the clinical tests used to attempt to determine the site of arterial compression are not specific and often yield positive results in asymptomatic patients, further confuses the diagnosis. In spite of this, careful examination of the patient and evaluation of the symptoms, plus indicated laboratory studies, usually lead to the correct diagnosis. The cervical rib syndrome, the scalenus anticus syndrome, the hyperabduction syndrome, and the costoclavicular syndrome all result from abnormal neurovascular compression at the thoracic outlet. The physical examination in diagnosing each of these syndromes is fairly specific; however, the entire group is better termed thoracic outlet syndrome, and the one common denominator in each of these is the first thoracic rib.[1] This single fact has made therapy of this problem much more clinically acceptable.

The differential diagnosis includes cervical spondy-

TABLE I

Patient	*Sex*	*Age*	*Clinical Synopsis*	*Physical Exam*	*Operation*	*Result*
1.	F	45	No history of injury. Five-month history of soreness and pain in the left shoulder, neck and arm, made worse with using arm, particularly above shoulder level. Episodic numbness left 4th and 5th fingers.	Positive Adson.	5-14-70 First rib resection.	4-21-71 Negative Adson. Negative AER. Asymptomatic.
2.	F	51	No history of injury. One-year history of unilateral headache and numbness, with coldness and weakness, with elevation of each hand above shoulder level. Had bilateral scalenotomy with relief of headache and stiffness in neck, but no improvement of hands.	Left and right radial pulse obliterated with AER. Positive Adson and HA. No neuro deficit.	6-15-70 Right rib resection. 6-23-70 Left rib resection.	4-21-71 No symptoms. Negative Adson and AER bilaterally.
3.	F	26	Five to six weeks of tingling and numbness with weakness in left hand and arm when elevated above shoulder level. Arm so weak she "dropped her baby." Unilateral stiff neck and headache of three months' duration. No history of injury.	Positive left HA. Positive Adson. Positive AER.	9-10-70 Left rib resection.	9-23-70 "Left hand warmer." Negative Adson and AER. Moved to Texas.
4.	F	23	Six-months weakness and numbness in left hand with exercise; worse if elevated above shoulder level. No history of injury.	Positive Adson and AER. Negative CC and HA.	3-25-70 Left anterior scalenotomy. 4-21-70 Left rib resection.	4-15-70 No relief. 9-19-70 Numbness, medial aspect left arm. No weakness. Negative Adson. December 1970 Asymptomatic.
5.	M	44	Occupation, electrician. No history of injury. Four to five months progressive left C_8 and T_1 numbness. Weakness, with exacerbation of numbness by elevating hand above shoulder level.	Numbness and paresthesis with AER, Adson, CC and HA. Radial pulse damped but not obliterated with AER.	3-13-71 Left rib resection.	4-22-71 Much improved paresthesis. Negative AER. Improving numbness, medial aspect of left arm.
6.	M	29	Occupation, accountant. Three and one-half years' history pain in right shoulder, with numbness, weakness and tingling in right fore-arm. No history of injury.	Positive AER and HA.	3-23-71 Right rib resection.	4-15-71 Hyperesthesia medial aspect right arm. Negative AER. Right hand "warmer and stronger." C_8 and T_1 numbness nearly gone.

AER: Examination with abduction of arm in external rotation. Positive test is obliteration of radial pulse.
HA: Hyperabduction maneuver.
CC: Costoclavicular maneuver.

litis, cervical intervertebral disc disease, and carpal tunnel syndrome. In each of our reported cases, we felt clinically comfortable that the diagnosis had been correct and, in each of our cases, the patient was made either asymptomatic or markedly improved by transaxillary resection of the 1st rib.

Summary

We are here reporting our experience with seven cases of thoracic outlet syndrome with excellent results in each case. A plea is made for reconsideration of this problem as a physical disease, with resection of the 1st rib as indicated therapy when the patient has not responded to conservative treatment.

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Hypoglycemia

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Vox Dox

Vox Dox Editor:

Congratulations on your courage in writing the editorial "In Union There Is What?"

Every now and then we need to be reminded that we practice a profession and follow a calling.

A study of the history of medical care reveals quite clearly that our patients, the public, determine the patterns of care and determine our status, whether we are slaves, field barbers, or in our current affluent position.

It is our job as physicians to offer such quality care that our patients, the public, are satisfied and if there are changes needed in the patterns of care, that the public looks to us respectfully for advice rather than seeking political and non-professional answers to what they feel are problems in care.

Again, I am most pleased with your editorial, and I am keeping it in my permanent file.

J. L. Morgan, M.D.
Emporia, Kansas

Hypothermia and Surgery

Carotid Endarterectomy Under Hypothermia: (A Forgotten Modality)

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Approximately 10 to 40 per cent of patients with cerebrovascular insufficiency will be found to have responsible lesions in the extracranial peripheral vasculature.[10, 13] Recognition of the natural history of this disease process should prompt careful evaluation early in the course of the disease in order to select those patients from whom operative intervention may prevent major vascular accidents.

About 10 to 25 per cent of strokes occur from carotid occlusive disease.[13] It is imperative that one recognizes early the syndrome of Transient Cerebral Ischemia (TCI) manifested by intermittent sensorymotor dysfunction associated with temporary speech defects, temporary visual disturbances, and dizziness or lightheadedness, since 50 to 80 per cent of patients with TCI will have a major stroke within one year.[10] The converse is likewise true, in that 50 per cent of patients with strokes have a history of previous transient cerebral ischemic episodes.[11]

It is only in this group of patients that surgical therapy gives satisfactory results, because patients with TCI have a high incidence of incompletely obstructing lesions.

Clinical Material

Over a period of five years, 1966-1971, a total of 49 patients have undergone elective carotid endarterectomy. Three of these patients had bilateral disease, making a total of 52 carotid endarterectomies. Their ages ranged from 46-75, with the mean age of 61 years. Six of these patients were females, 43 were males. The most common presenting symptom was that of transient cerebral ischemic attacks. These data represent 52 consecutive experiences utilizing systemic moderate hypothermia demonstrating its value and minimal morbidity.

Diagnosis

The majority of patients were referred from neurosurgeons, neurologists, or from some specialty physicians.

Transient cerebral ischemic attacks constituted the most common presenting symptom complex. Patients routinely underwent skull x-rays, brain scans, echo encephalography and electroencephalography studies to rule out other concomitant disease processes. Arch aortographic evaluation was performed on all patients to rule out vertebral basilar disease or to assess the origin of major vessels. Selective carotid angiography was commonly performed.

Treatment

The same technique was utilized on all 52 carotid endarterectomies. Following Pentothal induction of general anesthesia with endotracheal intubation, systemic hypothermia utilizing the K-thermia unit and ice bags is initiated to 34-34.5 C. Warming is instituted at this temperature since a 1-1.5 C drift occurs. Cardiac complications occurring at 30-31 C preclude cooling below this temperature.[1]

The incision is made when the temperature reaches 34-34.5 C. The artery is approached through an incision paralleling the anterior sternomastoid muscle border. Dissection and mobilization of the common carotid artery, internal and external carotid arteries at the bifurcation, is carried out. One per cent Xylocaine is injected into the carotid body prior to manipulation. Control tapes are placed proximally and distally. Polyethylene internal shunts are then routinely inserted and endarterectomy is performed. When the caliber of the vessel appears compromised by closure, synthetic patch grafts should be applied. However, in this series this was not necessary. When bilateral disease is present, the non-dominant side is done initially. After three to four days, the opposite side is performed, completing both sides during one hospitalization. The mean hospital stay is four days.

The effects of moderate hypothermia on cerebral metabolism have been repeatedly documented to produce reductions in cerebral metabolism.[2, 3] The response may be variable according to age, degree of cooling, health of the patient, etc., but between 30-32 C it usually lowers cerebral metabolism 40-75 per cent.[2]

This is very important in a brain already compromised by vascular insufficiency. The primary value

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consequently is to reduce oxygen requirement for a system metabolically unable to contract an oxygen deficit.

Consequently, with a reduced metabolic rate, the amount of required anesthesia is less.[8, 12]

The postoperative stress reaction likewise has been shown to be diminished with an alteration in the sodium retention mechanism.[1] Myocardial irritability is a complication of utmost concern, and this is directly related to the degree of hypothermia utilized.[3]

Complications

Myocardial irritability was the only major intraoperative complication which was detected immediately since EKG monitoring is performed routinely. It responded well to intermittent small doses of Lidocaine intravenously.

Only one immediate postoperative complication developed. This occurred in a 48-year-old male who was found to have weakness in his left arm immediately following right carotid endarterectomy. This subsequently progressed to a complete left hemiparesis. This single case was the only postoperative stroke.

All other patients improved postoperatively. All patients (eleven were lost to follow-up) have been followed or communicated with by letter. These patients have experienced significant improvement. One of these patients, who had bilateral disease and bilateral procedures at separate times, developed a minimal right hemiparesis in the second year postoperative. This subsided and the patient is now free of residual neurologic deficit. Postoperative angiography was not performed in these patients.

Comments

It is mandatory that extracranial arteriosclerotic occlusive vascular disease be recognized when the patient develops TCI in order to offer a satisfactory result.[4, 6, 7, 9]

Multiple studies have consistently demonstrated surgically poor results in patients with persistently progressing stroke or completed strokes secondary to extracranial carotid occlusive disease.[4, 6, 11]

Likewise, one must differentiate carotid from vertebral artery insufficiency since the latter is not usually improved by surgical intervention.

Neurologic symptoms of carotid disease usually involve contralateral motor sensory deficits and ipsilateral monocular visual disturbances or combinations of the deficits. Vertebral basilar insufficiency frequently presents with bilateral motor sensory deficits with bilateral visual or auditory disturbances and cerebellar dysfunction.

The patients with either of these disease processes also have a high incidence of multiple lesions secondary to arteriosclerotic change.[5, 6] Aneurysms, coronary artery disease, peripheral vascular occlusive disease of the terminal aorta and lower extremities occur frequently.

Summary

Fifty-two consecutive cases of patients undergoing carotid endarterectomy under general anesthesia with hypothermia and internal shunts have been presented. We feel that this procedure is very safe and carries a negligible postoperative stroke rate. The complications of well conducted systemic hypothermia are certainly negligible.

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The President's Message

Minority Discrimination

Have you ever considered yourself to be a victim of minority discrimination?

You are!

Look what Phase II does to you and not to all.

Observe the discrimination against you in the draft laws.

Remember the retroactive taxation levied upon you when you were dragged into Social Security against your wishes. Remember, too, that we were eligible for only reduced benefits when first covered by that law.

Read the paper's daily articles blaming you for shortage of physicians in the ghettos and in rural areas. How could you have anticipated the sudden redefinition of medical care as a "human right," or filled the needs this brought about? Why are you to blame that few doctors wish to live and work in the terrible ghettos, or in the cultural isolation of rural America? Why are you to blame for the economic unattractiveness of these areas?

Why do insurance companies think it proper to question your prices, and discredit you and your fees with your patients?

We are a persecuted minority!

No one has set up governmental agencies to protect you.

I implore you—join the Foundation, contribute handsomely to KaMPAC, quit bickering among ourselves, get to work for our common (and the public's) good. Let's push back a little!

Kenneth L. Graham MD

President

Editorial COMMENT

From the Tales of Old Cliche

Among our more peculiar habits is that of reading recipes which appear from time to time in the *Evening Pulp,* a practice we can't account for other than a continuing fascination with some of the strange things people can do to food. Having neither culinary ability nor aspirations, we presume our interest may be akin to that of the fireside roué for his current issue of *Playboy.* Inasmuch as chocolate has for us approximately the same appeal as mammae have for the *Playboy* addict, we were attracted to a recent recipe for chocolate roll. Instructions were given for making the filling and the cake, the latter being placed on top of the former and the combination being inverted onto a towel for the rolling process. The final word was, "Do not roll the towel."

In one of those blinding flashes when the Veil is lifted from Eternal Truth, we realized that these words epitomize the entire human relationship even as $E=mc^2$ does for the universe. Mankind stands with its two basic elements juxtaposed: those who do and think everyone should, and those who don't and think everyone should not. All divisions and categories of human thought derive from these. Herein is the conflict which must be resolved before the lost Paradise will be regained.

The anti-rollers of the world act from the conviction that if they can persuade the rollers to forsake their cultural dictates, they will learn the joys of chocolate roll that doesn't have to be chewed so long or swallowed with such effort. There is even a delicacy of flavor—a bouquet—which makes up for the lack of body when the towel is lacking. This really is, you see, an attempt to elevate them, to improve their lot, to make them—well—more like *us.* True, some of the hard core rollers will demand their right to retain grandmother's recipe for chocolate roll *mit Handtuch* as a principle of freedom, but it was long ago pointed out by a wise man that freedom does not give license to shout, "Fire Sale," in the crowded towel department of the local emporium.

The anti-rollers are not easily put down. They realize they must communicate with these people, they must keep the lines open. At least, if they are talking, they aren't chomping on towels. In compassion, the anti-rollers realize that the rollers act from the poverty of their intellect thrust upon them by generations of exclusion and discrimination. Never having known a life in which they need not roll the towel, they could never achieve equality with their enlightened comrades without the guidance of the privileged. They are, after all, the unwilling victims of a social structure that has forced them to roll the towel because they didn't know what else to do with it. These unfortunates must, of course, be saved from themselves.

It is not just an idealistic dream, it is a social and economic necessity. If the practice of towel-rolling is permitted to go unchecked, these benighted souls are at risk of developing bezoars (known in medical circles as "towel bowel"). Why should we suffer outrageous insurance rates because of the high cost of chocolate roll lovers reclaiming their towels at the local Hotel Dieu? Our present health care system cannot contend with the problem. Emergency room service would break down. Physicians would have to give up spending every afternoon on the golf course. The courts would have to retool to handle the cases of surgeons being sued for taking towels out rather than leaving them in.

It must be recognized that there are those who would viciously include the towel for their own distorted motives—those who cannot live within the laws of man, those whom society has unwittingly traumatized and who now plot their revenge. They don't declare themselves. They move about in their own lonely worlds—you mingle with them on the street, in church, at the goofy golf course. Then, one day, something snaps, and another three-layer chocolate roll is discovered in a locker in a crowded airport. One's animal impulse is to destroy such misfits, but that reduces us to their level. We must learn to recognize them and neutralize them with love.

But some sinners don't want to be loved. The cry comes back, "If I choose to roll the towel, who shall say me nay?" If consenting adults wish to take their chocolate roll with a bit of cotton, who shall invade their privacy to deny them this right? If the Founding Fathers had intended that the free men of this great land eat their chocolate roll *sans serviette,* they would have said so in the Constitution. The recipe's seem-

ingly innocent admonition is in reality an insidious threat to all we hold sacred. Next would come the Presidential Directive requiring the posting on the door of each man's castle the statement, "The occupants of this house, apartment, hostelry, or other domicile do not roll the towel." The next step would be the establishment of block patrols who would make midnight raids to root out the free-thinking cooks from their underground kitchens where they are turning out revolutionary chocolate rolls with red, white, and blue terry cloth linings. Youth will cry in agony, "You taught us to be materialistic. Now you want to take away the material." The Federal Agency for the Control of Towels (FACT) will be created with the power to require licenses for the possession of towels (hand towels, anyway), necessitating, of course, a Congressional appropriation to fund it. All this in spite of the fact that it is well known that towels don't kill people, people kill people. Throughout the length and breadth of this great land (political rhetoric is strong this year), the light of freedom flickers and dims as man is denied the right to throw in the towel if he wishes.

Well, with a liberal dose of antacid, the fantasy passed. The lion and the lamb are not yet ready to snuggle. And anyway, the recipe only served eight—maybe a couple more with the towel.—*D.E.G.*

NEW MEMBERS

The JOURNAL *takes this opportunity to welcome these new members into the Kansas Medical Society.*

F. G. Burgeson, M.D.
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Medical-Legal Page

Punitive Damages Denied for Operation on Wrong Patient

Punitive damages could not be recovered where a physician, acting in good faith, did not know that he was operating on the wrong person and there was no evidence of malice, a California appellate court ruled.

Two women were admitted to a hospital and scheduled for surgery at the same time. One woman was to have a breast biopsy and the other, gallbladder surgery. The patients were on the same ward and were attended by the same nurses. As a result of a mixup in charts, each patient underwent the surgery scheduled for the other.

When the surgeon scheduled to perform the gallbladder surgery opened up the patient's abdomen and found a normal gallbladder, he examined the chart and the patient's wrist band and discovered the error. The surgeon operating on the other patient soon discovered the error and repaired the wound he had made.

The patient scheduled for breast biopsy brought action against both surgeons, the hospital, and the medical group to which the surgeon who opened her abdomen belonged. She sought to recover compensatory and punitive damages. The jury awarded her $7,500 compensatory damages against all parties and punitive damages of $10,000 against her own surgeon, $5,000 against the second surgeon, $30,000 against the hospital, and $30,000 against the medical group.

An appeal by the patient's surgeon and the hospital was dismissed because of entry of a judgment in their favor notwithstanding the verdict. The second surgeon and the medical group appealed, contending that the issue of punitive damages should not have been submitted to the jury and that if punitive damages were a jury issue then the court's instructions were in error. They did not challenge the award for compensatory damages.

In order to warrant an award of punitive damages, an act must be both intentional and accompanied by aggravating circumstances amounting to malice, the appellate court said. It was not sufficient that there be mere spite or ill will. Mere negligence, even if gross, would not justify an award of punitive damages. Under the law, the only form of malice creating the right to exemplary damages is malice in fact. Malice in fact is defined as a desire to do harm for the mere satisfaction of doing it.

There was no evidence that the surgeon was guilty of malice, the court pointed out. Although the surgeon's action was negligent, amounting to technical battery, the facts showed that he did not know he was operating on the wrong person. Due to inadvertence, the surgeon was acting under a mistake of fact. Punitive damages could not be recovered where a person acting in good faith committed battery under a mistake of fact.

There was also error in awarding punitive damages against the medical group, the court said. Although an employer could be held liable for an employee's act under the doctrine of *respondeat superior,* he was not responsible for punitive damages when he neither directed nor ratified the act.

There was prejudicial error in the trial court's instruction to the jury that punitive damages could be allowed if it found that the wrongful act was willful, reckless, wanton, or so recklessly done as to imply disregard for the obligations and rights of the patients. According to this reasoning, the appellate court said, punitive damages would be allowable without the required aggravating circumstances amounting to malice.

The trial court had also instructed the jury that an employer might be liable for willful and malicious acts of a servant within the scope of his employment even though the employer had not authorized such acts. The appellate court held that such instruction was germane only to the issue of *respondeat superior* with regard to compensatory damages and did not apply to the question of an employer's liability for punitive damages. The court affirmed the portion of the judgment awarding compensatory damages and reversed the portion awarding punitive damages.—*Ebaugh V. Rabkin,* 99 Cal.Rptr. 706 (Cal.Ct. of App., Jan. 14, 1972)

Pathologist's Report May Be Admitted Into Evidence

A pathologist's report concerning a deceased patient should have been admitted into evidence during a malpractice trial, according to a Michigan appellate court.

A 26-year-old patient had a malignant lump on her breast. Her physician performed a radical mastectomy. The patient was then taken to an operative recovery room. Several hours later, it became apparent that the patient's condition was rapidly deteriorating. Her physician was located and remained at her side until she died, shortly thereafter.

A postmortem examination was conducted by a pathologist, who wrote up a report which became a

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part of the hospital records. Suit was thereafter brought against the physician and the hospital, charging negligence in the death of the patient.

At the trial, the pathologist's report was offered as an exhibit. The trial judge refused to admit the report as an exhibit but did permit its author to be cross-examined concerning his report. Cross-examination indicated pathological findings of cerebral edema, hypoxia, hyperemia, and acute pulmonary edema. All of these conditions may be caused by a shortage of oxygen and they could all produce death. Since the furnishing of oxygen to the patient was the duty of the hospital, the pathologist's report was damaging to the hospital.

In affirming a jury verdict for the physician, the court stated that there was no medical testimony that the physician's handling of the case was not in accord with the standard practice of skilled physicians in the community. However, the court reversed the verdict for the hospital and ordered a new trial.

The court held that the pathologist's report should have been admitted into evidence. A state statute authorized the admission of such evidence. As an admitted exhibit, the report could have been available to the jury during its deliberations. The fact that the report was unavailable was prejudicial.—*Abbe v. Woman's Hospital Association,* 192 N.W.2d 691 (Mich.Ct. of App., Aug. 23, 1971; rehearing denied, Oct. 8, 1971)

WORLD HEALTH ORGANIZATION FELLOWSHIPS AVAILABLE TO UNITED STATES HEALTH WORKERS

The World Health Organization will make available in 1973 a limited number of short-term fellowships for travel abroad related to the "improvement and expansion of health services" in the United States. This support is to United States citizens engaged in operational or educational aspects of public health.

In selecting applications, a special committee will consider the professional background of the individual, the field and locale of the study proposed, and the utilization of the experience by the applicant on his return. Employees of the federal government are not eligible. Applications will not be considered for the pursuit of pure research projects, for attendance at international meetings, nor from students in the midst of training at either the undergraduate or graduate level. Applicants may not be more than 55 years of age.

A fellowship award will cover per diem and transportation. Except in very unusual circumstances, it will be limited to short-term travel programs averaging about two months. Employers of successful applicants will be expected to endorse applications and to continue salary during the fellowships.

Priorities of award will be established up to the total of the funds available. The deadline for the receipt of completed applications is September 30, 1972.

Further information may be obtained from Dr. Robert W. Jones, III, Chief, Foreign Students Education Branch, Fogarty International Center, National Institutes of Health, Room B2CO5A, Building 31, Bethesda, Maryland 20014.

STUDENT-AID PROGRAM

The Robert Wood Johnson Foundation today announced a four-year $10 million student-aid program to increase the number of future doctors likely to enter practice in medically underserved areas.

Under the program, all the nation's 108 schools of medicine and 7 schools of osteopathy will receive four-year grants for use as scholarship and loan awards to women students, students from rural backgrounds, and those from the country's black, Indian, Mexican-American, and U. S. mainland Puerto Rican populations.

Dr. David E. Rogers, President of the Foundation, said that the plan to focus the grants on these groups of students was based on two main considerations:

- Evidence indicating that student physicians with such background characteristics are the most likely to choose practice locations in underserved areas upon completion of their professional training.
- The decision by the Foundation to concentrate on the improvement of access to personal health services as one of its principal goals.

The student-aid grants programs is the Foundation's first important effort in its transition to a major national philanthropy in health.

The Foundation was established in 1936 by the late General Robert Wood Johnson, who died in 1968, leaving the Foundation the bulk of his estate. This bequest was received by the Foundation in 1971, bringing its year-end assets to approximately $1.2 billion—and marking its change from a local institution to a national health foundation.

The Foundation's program of student-aid grants is intended to help offset the extreme shortage of physicians in rural areas and inner-city communities, and is thus directly related to the Foundation's goal of improving access to medical care in American society. Funds will be allocated in such a way as to recognize those schools that have made the most effort to enroll needy students. The amount each school will receive under the Foundation's program will be determined by a two-part formula:

$5 million will be distributed as a base award, identical for all institutions except non-degree granting schools, which will receive half the base.

For the purposes of the program, non-degree granting schools are new schools that did not award the professional degree during the 1971-72 fiscal year, as well as two-year basic sciences schools.

$5 million will be distributed as a supplemental award according to each school's percentage of the total national pool of women students and students from rural and minority backgrounds enrolled in medicine and osteopathy in the 1971-72 academic year.

The supplemental award will be calculated by totaling up the number of women, blacks, Indians, Mexican-Americans, mainland Puerto Ricans, and students of rural backgrounds enrolled in the 115 schools concerned and then calculating the percent of the pool located at each institution.

Under this formula, a four-year school that enrolled 2 per cent of the total student pool covered by the program, would receive a supplemental award of approximately $100,000 in addition to a base award of approximately $46,510, for a total grant of $146,510.

The full amount of each grant—base award plus supplemental award—will be paid in a lump sum. The grants will be restricted to the categories of students covered by the program and must be expended within the four-year period starting with the school's 1972-73 fiscal year.

Otherwise, each school will have full discretion in the management of the grant, including the annual rate of expenditure and the proportion allocated between scholarships and loans.

As a condition of eligibility for the full amount of its grant, the school will be asked to maintain, in addition to the grant funds, the level of its expenditure of non-federal student-aid funds at no less than 95 per cent of the average it has expended during the last two years. Grants to schools that do not feel that this "maintenance of effort" provision is feasible for them, will be reduced by the difference between the 95 per cent level and the schools' actual projected expenditures for the next fiscal year. The Foundation expects to complete payment of all 115 grants during the summer.

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(Continued from page 408)

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RHEUMATIC FEVER PREVENTION

The Kansas Secondary Rheumatic Fever Pilot Program conducted by the Kansas Heart Association has been completed. As a result, parts of the KHA low-cost rheumatic fever prevention program will be transferred to the State Board of Health for administration. Under this program, free medication will be provided to qualified patients, physicians, and pharmacists.

More detailed information about this change will appear in the JOURNAL, as well as directly by mail to those participating in the program.

Woman's Auxiliary

A long time ago in Annie's youth, when some misguided citizen got into trouble, Annie's grandmother would click her false teeth together and, "Tut-tut." Then she would state wisely, "There's no rest for the wicked."

Grandma didn't know it, but there's no rest for Auxiliary workers either. Especially if anyone has given you a job to do that "you'll have plenty of time during the summer" to accomplish.

This last is one of the main arguments people use when they ask you to do something several months ahead of time. It is also one of the biggest overstatements one can make. Having been caught in this web and having used it herself, Annie is familiar with the system. Absolutely nobody is better at this sort of thing than Auxiliary workers who need to get ready for a fall schedule.

You thought all we did in summer was untangle teenagers from phone cords and grown kids from umbilical cords, didn't you? Never. We work. We start working almost the minute the state meeting is over, delegating work if we are national officers, trying to set up committees if we are state officers, or planning state fall board meeting and regional workshops, and completing fall and winter schedules and activities if we work at the county level.

After sort of getting one's wits together to plan, one has to hunt up someone to do the work. In summer, this is easier said than done. If you aren't out of town, Mary Sue Jones, the only person in the whole Auxiliary that you would trust with the job at hand, is on vacation. When you are, she isn't. Phones ring unanswered and letters lie mouldy in the mail. Sometimes you wake up sweating a little from a nightmare about a dozen committees meeting with no chairman, or a party all fixed and no one invited the guests.

But vacations, kids and company never let a dedicated Auxiliary worker stray from her appointed rounds. In spite of hundreds of extra meals to cook, thousands of towels to wash for swim-crazed kids, or catering meals and making up beds for assorted relatives that run the gamut from your in-laws to fifth cousins twice removed, Kansas Auxiliary workers have managed to: 1) get the year book out, 2) get the Health Careers Bus ready for the road complete with a dozen health field displays, 3) plan a state board meeting, 4) plan five Kansas regional conferences for fall, 5) answer a million letters and phone calls relating to all these, and 6) even attend the AMA in San Francisco. (Some of us did, anyhow.)

However you feel about it, that's quite a summer. In between this, Annie, like other Annies in the Auxiliary, has sewed college clothes for the offspring and hemmed up a couple of dresses for herself so she can get around faster. The hems are a little crooked, you understand, but as Grandma also said, "You'd never notice it on a galloping horse . . ."

So, we're all lined up at the posts and ready to go for fall. We think you'll like what we've managed to do, but we'd rather tell you about it later. Right now, "They're off! ! !". . . . and Annie's going fishing.

Yourn,

Auxiliary Annie

AREA PHYSICIANS HONORED

The American College of Physicians (ACP) has announced that a total of 266 physicians in the United States and Canada have been made Fellows, and 179 physicians were admitted to membership in the 57-year-old international society which represents specialists in internal medicine and related fields.

The new member from Kansas is Edwin L. Petrik, Topeka. The new Fellows from Kansas are: Lynn H. Kindred, Prairie Village; Albert P. Mitchelbach, Wichita; David A. Rater, Shawnee Mission.

To qualify for Fellowship, the physicians must have earned the Fellowship honors through scientific accomplishments as evidenced by such qualifications as certification by their specialty boards, publication of reports on scientific work, appointments to the staffs of academic or clinical institutions, and by their acceptance as leaders in their specialties as determined by fellow practitioners.

Admission to the member category is based on evidence of eligibility for certification by the national board representing the specialty field. Members must have graduated from a medical school at least six years prior to their application and have been a practitioner, teacher or researcher in their specialty field for at least two years.

The Month in Washington

The National Institutes of Health has announced it will conduct major study of acupuncture, the ancient Chinese medical practice of curing illness and relieving pain by piercing the skin with needles. The study would involve use of acupuncture as an anesthetic and alleviation of pain from neuralgia, nerve injuries, and cancer.

It is predicted the study, to cost "hundreds of thousands" of dollars, would lead to acupuncture treatment of American patients within a year.

The announcement was made in a statement by Dr. Robert Q. Marston, NIH Director, who said the investigation was recommended by a committee of experts in anesthesiology, neurology, neurophysiology, and psychology. Committee chairman was Dr. John J. Donican, a pain authority at the University of Washington School of Medicine in Seattle.

"After considering the many suggested uses of acupuncture, the Committee recommended that the most valuable first approach in the United States would be studies on the method's use for surgical anesthesia and for the alleviation of certain chronic pain syndromes," Marston said.

Among uses considered by the Committee but rejected for immediate exploration were acupuncture treatment for arthritis, toothache, low back pain, rheumatism and insomnia.

The fate of the physicians' draft next year rests with Congress and the extra pay bill for military physicians, a measure now before the House Armed Services Committee.

Little controversy has cropped up over the legislation and, barring some unexpected obstacle, it stands an excellent chance of whisking through Congress before adjournment this year.

Designed to "facilitate the establishment of an all-voluntary army and to maintain sufficient numbers of career officers in critical areas," the pay bill authorizes yearly bonuses of up to $17,000 for qualified physicians "in addition to any other pay or allowances to which he was entitled."

This would be in addition to the $100 a month extra pay for the first two years of service and $350 a month thereafter.

Federal funds have been withheld from 579 nursing homes for failure to meet minimum standards of health and safety as ordered by President Nixon last August.

HEW Secretary John Veneman said 327 nursing homes lost their certification; another 252 homes withdrew from the program because they were unable or unwilling to meet the standards.

Of the approximately 7,000 homes receiving federal nursing home aid, 1,469 received full certification and 4,766 were certified for six months to give them time to correct deficiencies not affecting health and safety. An additional 244 are still in the certification process.

Veneman's report covered only nursing homes which received federal aid under the medicaid program. It did not affect the approximately 16,000 homes for the elderly not receiving such assistance.

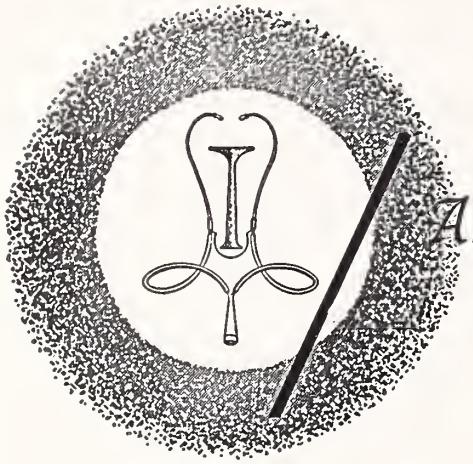
Some relaxation of tight fee hike controls on physicians may be in the offing. Health Services Industry Committee is considering changes in basic regulations covering institutional and non-institutional providers. There is a possibility that the present 2.5 per cent limit may be upped to some degree on allowable fee increases for physicians and dentists, lowest rate permitted for any profession except those with more than 60 employees. Committee members believe controls have worked well to date in the health field, pointing to sharp slash in cost rise since control imposition.

The Administration soon will recommend legislation to halt illegal traffic in methadone as a substitute for heroin.

John Ingersoll, Director of the Bureau of Narcotics and Dangerous Drugs, told the National Commission on Marijuana and Drug Abuse: "The increase in the last several years is so dramatic as to indicate that our present legal controls are inadequate."

Ingersoll said that in New York City, 92 per cent of a group of heroin addicts reported they had been offered illegal methadone by pushers, and 13 per cent said they had sold it themselves.

He said a similar study in Miami showed that 40 per cent of the applicants to a legitimate methadone maintenance center already were using the drug illegally.



Announcements

Professional meetings, conferences, and postgraduate courses of national importance are listed for the **Doctor's Calendar.** ***Notice of the session is posted in advance to allow the physician time to make preparations.***

SEPTEMBER

Sept. 10-16 — *Clinical Gastroenterology* (postgraduate course), Castle Harbour Hotel, Bermuda. Write: Vernon M. Smith, M.D., 301 St. Paul Place, Baltimore, Maryland 21202.

Sept. 11-12 — 32nd Annual AMA Congress on Occupational Health, Drake Hotel, Chicago.

Sept. 19-21 — American Rhinologic Society Workshops and Seminars in Nasal Diagnosis and Corrective Surgery, New Orleans-Mariott Hotel, New Orleans. Write: Gerald F. Joseph, M.D., 3622 Government St., Baton Rouge, Louisiana 70806.

Sept. 22-23 — Kansas Heart Association 23rd Annual Meeting. Broadview Hotel, Wichita.

Sept. 27-29 — 7th National Cancer Conference, Biltmore Hotel, Los Angeles. Write: Sidney L. Arje, M.D., 219 East 42nd St., New York, New York 10017.

OCTOBER

Oct. 2-6 — American College of Surgeons, Clinical Congress. Fairmont Hotel, San Francisco. Write: S. F. Arado, ACS, 55 E. Erie, Chicago 60611.

Oct. 4-5 — Child Development and Child Psychiatry Conference. University of Missouri Medical Center, Columbia. Write: M-175 Medical Center, Columbia, Missouri 65201.

Oct. 11 — Management of Streptococcal Infection. University of Chicago Continuing Medical Education, Chicago 60637.

Oct. 14-19 — American Academy of Pediatrics Annual Meeting, Hilton Hotel, New York City. Write: Dept. of Public Information, 1801 Hinman Ave., Evanston, Illinois 60204.

Oct. 19-21 — Annual Course in Postgraduate Gastroenterology. Hotel Bonaventure, Montreal, Canada. Write: American College of Gastroenterology, 299 Broadway, New York 10007.

Oct. 24-26 — American College of Chest Physicians Scientific Assembly, Convention Complex, Denver. Write: ACCP, P. O. Box 93884, Chicago, Illinois 60690.

Oct. 30-Nov. 1 — Omaha Mid-West Clinical Society, Hilton Hotel, Omaha. Write: Mary E. Pilloud, Executive Secretary, 1040 Medical Arts Bldg., Omaha, Nebraska 68102.

The following medical meetings will be held in Israel during 1972:

Sept. 25-29 — International Workshop on Medicine.

Oct. 9-13 — International Congress of Orthopedic Surgery and Traumatology.
Second International Belinson Symposium on the Various Faces of Diabetes in Juveniles.

For meeting and travel information, write: Israel Government Tourist Office, 5 South Wabash Avenue, Chicago 60603.

POSTGRADUATE EDUCATION

American College of Chest Physicians:

Sept. 21-23 — *Coronary Artery Disease* (Mt. Sinai School of Medicine, New York City)

Oct. 5-6 — *Ventricular Function* (Santa Barbara Heart and Lung Institute, Santa Barbara, Calif.)

For information write: Arnold Harris, 112 E. Chestnut St., Chicago, Illinois 60611.

University of Colorado School of Medicine:

Oct. 9-13 — *High Risk Infant Care* (limited)

Nov. 27-29 — *Battered Child*

For further information write the Office of Postgraduate Medical Education, University of Colorado School of Medicine, 4200 E. Ninth Ave., Denver 80220.

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The Journal accepts short classified advertising from the members of the Kansas Medical Society without a charge. These ads run in three consecutive issues of the Journal and are keyed with a correspondence number. All replies are forwarded immediately to the advertiser. Other brief classified ads are accepted from members of the medical profession only upon approval of the Editor or Editorial Board.

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THE Journal OF THE Kansas Medical Society

OCTOBER
1972

VOL. LXXIII
NO. X

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Volume LXXIII, Number 10—October, 1972

The JOURNAL of the KANSAS MEDICAL SOCIETY

Contents for October

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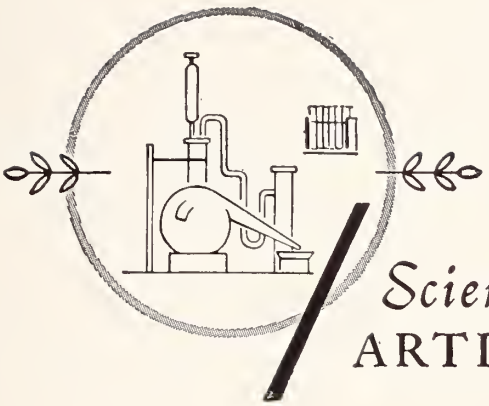

Scientific
ARTICLES

Alcoholic Liver Disease

The Role of the Small Intestine

J. BEATTY HUNTER, M.D.,* DONALD D. MOELLER, M.D.,*
G. DEWEY DUNN, M.D.,† *and* ARTHUR P. KLOTZ, M.D.,*
Kansas City, Kansas

Malabsorption in cirrhotics is most accurately determined by fecal fat determination. D-xylose excretion and serum carotene levels are not good indices of malabsorption in these patients because of the increased possibility of false positive and false negative results.

OF THE 320 PATIENTS with alcoholic liver disease reported in the literature from 1950-68, about 50 per cent have evidence of malabsorption. Various authors have felt the cause of this malabsorption to be pancreatic insufficiency,[1] malnutrition,[2, 3] lack of secretion of bile salts,[4–6] and mucosal abnormalities.[7, 8] As part of a longer protocol studying malabsorption in cirrhotics, small bowel biopsies were performed and studies of small bowel function were obtained. This report analyzes the small intestinal aspects of malabsorption in patients with alcoholic liver disease with emphasis on small bowel biopsies performed here during 1966-69.

Materials and Methods

Eighty-five small intestinal biopsy specimens obtained at the Kansas City Veterans Administration Hospital between 1966-69 were reviewed. Random selection showed 14 of these patients to have biopsy-proven alcoholic liver disease (either cirrhosis or severe fatty change). The small bowel biopsies of seven cirrhotics, all with steatorrhea, were compared with the small bowel biopsies of eight other patients with biopsy-proven alcoholic liver disease who did not have steatorrhea, in an attempt to correlate abnormal small bowel morphology with steatorrhea. Serum carotene, d-xylose excretion test, portal hypertension, and hypoalbuminemia were also evaluated as indicators of malabsorption.

Studies which were used to characterize small bowel function were a 72-hour fecal fat study, serum carotene, and d-xylose absorption test. Charts were reviewed and abnormal findings were noted. Medications administered to these patients were also evaluated.

Small bowel biopsies were obtained using the adult Crosby capsule. Specimens were orientated and fixed in formalin. Hematoxylin and eosin stains were made of the paraffin imbedded specimen, and sections were made perpendicular to the mucosa. One pathology technician handled all the specimens and each was reviewed by the same pathologist. In addition, the authors interpreted the histology of these specimens.

* Section of Gastroenterology, University of Kansas Medical Center, and Kansas City, Missouri Veterans Administration Hospital.

† Dr. Dunn is an Assistant Professor of Internal Medicine at Vanderbilt University School of Medicine, and is on the staff of the Nashville Veterans Administration Hospital.

Results

Upon reviewing 85 small bowel biopsies, 14 of these patients with alcoholic liver disease were selected for this study. One cirrhotic with malabsorption who did not have a small bowel biopsy was included in the study. Included in this group of patients were 13 males and 2 females. The age ranged from 46 to 71, with the median age of 53. All of these patients had long histories of alcoholism. Twelve of the 15 patients had biopsy-proven cirrhosis. The liver biopsies of the remaining three patients showed fatty metamorphosis.

Group I refers to seven cirrhotics who showed marked malabsorption with abnormal 72-hour fecal fat and d-xylose studies. Two patients had abnormal small bowel biopsies.

Group II refers to eight alcoholics who did not have malabsorption (except for one who did not have the fecal fat study performed). All of these eight patients had abnormal small bowel biopsies. Five of these patients had cirrhosis and three had marked fatty metamorphosis.

Serum albumin levels, signs of portal hypertension, and small bowel morphology were evaluated as possible causes of malabsorption in these patients.

Fecal Fat Study

The patients were placed on a "chocolate milk diet" which contained 105 Gm of fat in 1.419 liter (1.5 quarts) of liquid taken daily. This diet was administered for three days immediately prior to the 72-hour fecal fat collection, as well as during the fecal fat collection.

Group I, malabsorbing cirrhotics, had elevated values (greater than 21 Gm of fat during the 27-hour collection period). In Group II, alcoholics with abnormal small bowel biopsies, none of the seven patients in whom the collection was performed excreted abnormal amounts of fat.

D-Xylose

Unfortunately, creatinine clearance, which must be normal for the d-xylose excretion results to be valid, was not performed on all of the patients. Patients were evaluated for the presence of ascites in which xylose is sequestered. This can give a false low estimate of intestinal absorptive function.

In Group I, the five patients who were tested, all excreted decreased amounts, but two patients had ascites; another patient had both ascites and a subnormal creatinine clearance; a fourth patient had a low creatinine clearance. Thus, only one of the five patients tested had an unexplained abnormal value. In Group II, all of the three patients tested were abnormal, but two of these patients did not have creatinine clearance performed, and one of these patients also had ascites. Thus, none of the three patients tested had unexplained abnormal results.

Serum Carotene

Fasting serum carotene levels were determined as follows. Group I showed two abnormally low values out of the seven malabsorbing cirrhotics tested. Only four of the eight patients in Group II were tested, but two of these were abnormally low.

Hypoalbuminemia

Because of the possibility that small bowel mucosal edema secondary to hypoalbuminemia may be a mechanism for malabsorption in cirrhotics, serum albumin-globulin values were analyzed. In Group I, five of the seven malabsorbers tested had albumin levels lower than 2.5 Gm per cent, but only two of these five patients with low serum albumin levels had mucosal abnormalities including mucosal edema. Interestingly, three of the eight nonmalabsorbing patients in Group II also had serum albumin values lower than 2.5 Gm per cent, and all three of these patients had mucosal abnormalities. None of the three patients with low serum albumin and mucosal abnormalities in the small bowel showed significant edema; they showed only slight mucosal atrophy.

Portal Hypertension

We used the presence of ascites and increased splenic uptake of radioactive isotope during liver scan as parameters of portal hypertension. In Group I, five out of six of the malabsorbers who had liver scans showed greater than normal isotope concentration over their spleens. Three of these seven patients also had ascites. One of the five patients tested in Group II with liver scans showed increased splenic uptake, and four of the eight patients had clinically detectable ascites.

Small Bowel Biopsies

Small bowel mucosal biopsies were obtained in 14 patients. Four of the six patients in Group I in whom a biopsy was obtained had normal histology. In contrast, none of the eight patients in Group II had normal biopsy specimens. All of these eight patients showed slight mucosal atrophy, and four showed edema of the mucosa.

The results of the various absorption tests were summarized according to groups in *Tables 1 and 2*. It is important to point out that six of the seven patients in Group I had normal pancreatic function tests.

Discussion

Steatorrhea accompanying cirrhosis is a well documented occurrence, but malabsorption does not nec-

TABLE 1

SMALL BOWEL FUNCTION AND MORPHOLOGY IN MALABSORBING CIRRHOTICS

Patient	Serum Carotene	Absorption: Fecal Fat Per 72 Hr (Normal = <21 gm)	Absorption: D-XYLOSE (NORMAL = >5 GM)	Absorption: CREATININE CLEARANCE, ML/MIN (NORMAL = >60 ML/MIN)	Ascites Present	Liver Scan	Small Bowel Biopsy Histology	Albumin/ Globulin gm %
1	81	53.7	2.2	103	No	Diminished uptake in right lobe	Normal	4.3/4.1
2	81	26.7	4.2	51	No	Mod. enlarged liver, dense uptake in spleen	Partial villous atrophy, edema	3.7/3.5
3	30	27	2.2	28	Yes	Marked enlarged liver, dense uptake in spleen	Normal	2.2/4.1
4	59	23.6	3.6	105	Yes	Marked enlarged liver, dense uptake in spleen	Normal	2.4/3.1
5	61	45.1			No	Not done	Normal	2.0/3.2
6	74	23.6	3.1	70	No	Filling defect in right lobe; mod. uptake in spleen	Not done	2.4/4.6
7	27	49.5			Yes	Mod. liver enlargement with decreased right lobe uptake, greater uptake in spleen	Slight edema, recent focal hemorrhage and congestion	2.3/4.4

essarily exist in all cirrhotics. Gross[4] and his workers reported abnormally high values for fecal fat excretion in 20 of 22 cirrhotics studied. Barona *et al.*[9] also found increased fecal fat excretion in 28 of 42 patients with cirrhosis of the liver. Sun *et al.*[1] found steatorrhea in 10 of 20 patients with Laennec's cirrhosis.

The exact cause of this malabsorption remains unknown. Numerous studies on this subject have yielded a variety of possible etiologies. Steatorrhea accompanying cirrhosis has been attributed to malnutrition, portal hypertension, hepatic damage with alteration in the secretion of bile, exocrine pancreatic insufficiency, and mucosal changes of the small intestine. All of these factors may or may not be of etiological importance in patients who have steatorrhea with alcoholic liver disease. In individual cirrhotics, the degrees of steatorrhea may vary with improvement of the underlying liver disease.[10] The various factors listed above often appear as combinations with perhaps multiple determinates of an elevated fecal fat study. It is also possible that various parameters of measuring the factors listed above might be abnormal without steatorrhea. When stool fats are done at various intervals in the same patient, variations in the above factors may change absorptive capacity.

Our main interest in this study was to evaluate the mucosal morphology in the small bowel in proven cirrhotics and to correlate malabsorption with the mucosal abnormalities, if possible.

Because of the presence of poor renal function (decreased creatinine clearance) and ascites in the majority of our patients, we felt that the d-xylose test was not a valid indicator of possible malabsorption. It has been shown that 60 per cent of the administered dose of d-xylose is metabolized, and the uptake of d-xylose is slower in cirrhotics.[9] With these variables (renal function, presence of ascites, and the possibility of altered d-xylose uptake and

TABLE 2

SMALL BOWEL FUNCTION IN PATIENTS WITH ALCOHOLIC LIVER DISEASE AND ABNORMAL SMALL BOWEL BIOPSIES

		Absorption						
Patient	*Serum Carotene*	*Fecal Fat Per 24 Hr (Normal = <21 gm)*	D-XYLOSE (NORMAL = >5 GM)	CREATININE CLEARANCE, ML/MIN (NORMAL = >60 ML/MIN)	*Ascites Present*	*Liver Scan*	*Small Bowel Biopsy Histology*	*Albumin/ Globulin gm %*
8 ...	55	13.5	2.5		No	Liver mod. enlarged	Edema and mild non-specific atrophy	3.2/3.4
9 ...	16	12.0	3.6	53	No	Liver mod. enlarged	Non-specific atrophy	3.0/3.5
10 ...	127			43.8	No	Liver mod. enlarged; decreased uptake in left lobe	Mild non-specific atrophy, edema	3.5/4.5
11 ...		9.3			Yes	Not done	Slight villous atrophy	1.7/3.7
12 ...		6.2			No	Normal	Slight non-specific atrophy, edema	3.0/3.5
13 ...		9.6			Yes	Decreased liver density; spleen marked increase in concentration	Slight non-specific atrophy	2.4/2.9
14 ...		20.2			Yes	Not done	Slight villous atrophy, edema	2.9/3.1
15 ...	30	8.5	4.4		Yes	Not done	Mild atrophy	1.9/2.7

metabolism by the diseased liver in these patients), we feel that d-xylose is a poor parameter of malabsorption in patients with alcoholic liver disease.

There was a poor correlation between abnormal serum carotene levels and steatorrhea in the 15 patients in our study. Of the seven patients with proven steatorrhea, only two had low serum carotene values; but three of the six patients tested who had abnormal small bowel mucosa, had low serum carotene levels. One of the patients had steatorrhea, abnormal serum carotene, abnormal d-xylose, partial villous atrophy of his small bowel mucosa, and an abnormal pancreatic function test. His abnormal absorptive functions might be on the basis of pancreatic insufficiency. Because carotene is metabolized by the liver to vitamin A, normal values may be present because of decreased clearance by a diseased liver in these patients. Malabsorption can give low carotene and a tolerance test might have been helpful. Again, serum carotene is probably a poor study to use in evaluating the malabsorption in patients with severe liver disease. Barona *et al.*,[9] found a positive correlation of abnormal fat absorption and low serum carotene in 10 of 32 patients with cirrhosis. Schwartz[8] found that only one of six cirrhotics had serum carotene levels below the low normal value of 50μg per cent.

Because some authors feel that a possible cause of malabsorption in patients with cirrhosis is due to portal hypertension,[7, 8] causing secondary vascular stasis in small bowel mucosa, we also evaluated the presence of portal hypertension in our patients. Of the six patients tested with steatorrhea, five showed increased splenic uptake on liver scan. Three of these five patients also had ascites. Two of the five malabsorbing patients with evidence of portal hypertension had an abnormal small bowel biopsy. Only one of the five patients tested in Group II with abnormal small bowel mucosa, but no steatorrhea, had increased splenic uptake; four of eight had ascites.

Astaldi and Strosselli[7] were able to demonstrate several nonspecific mucosal changes (including intense stasis of the axis of the villus, some degree of round cell infiltration, separation of the epithelium layer from the stroma, and crypt dilation) in ten pa-

tients, chosen because of the severe degree of cirrhosis present in each of them. The same pattern of mild and nonspecific abnormalities has also been reported in isolated cases of cirrhosis by Daniach and Shiner,[11] and Banks *et al.*[12] Marin *et al.*,[13] found only one patient of 12 with cirrhosis and malabsorption to have mild mucosal abnormalities, which was transient. Sun *et al.*,[1] found six patients out of 15 who were biopsied with malabsorption and cirrhosis to have congestion and stasis in the stroma of the villi, but there was no evidence of villous atrophy. Small bowel mucosal abnormalities were found in two of six of our patients with steatorrhea, while eight patients without steatorrhea showed slight villous atrophy and edema.

With hypoalbuminemia, a common-associated finding in most patients with cirrhosis, it is conceivable that edema of the small bowel mucosa secondary to low serum albumin may be related to the malabsorption of cirrhotics. Most authors agree that the critical value of serum albumin for the formation of edema is 2.5 Gm per cent. Five of the seven patients with steatorrhea had serum albumin values of less than 2.5 Gm per cent. Three of these five patients had ascites, but only two had mucosal edema in the small bowel. Interestingly, three of eight of the patients in Group II (nonmalabsorbing alcoholics with abnormal small bowel mucosa) showed hypoalbuminemia, but none of these three showed small bowel mucosal edema. Small bowel mucosal edema was noted in four other patients in Group II, all of whom had serum albumin levels greater than 2.5 Gm per cent. Berkowitz *et al.*[14] have shown a primary absorptive defect in congestive heart failure attributed to congestion and edema of the intestinal mucosa. Further investigation in cirrhotics may show a situation analogous to that found in congestive heart failure. In cirrhosis, this edema may be due to either hypoalbuminemia or portal hypertension, or a combination of both.

Another possible cause of small bowel mucosal atrophy which was investigated in our patients was that of neomycin therapy. Oral neomycin therapy has been shown by many investigators[15–17] to be associated with malabsorption and small bowel mucosal changes similar to those seen in nontropical sprue. Marin[13] found the high excretion of fatty acids in feces in three patients with cirrhosis returned to normal values one week after neomycin was stopped. Three of our ten patients with abnormal small bowel mucosa had been on oral neomycin therapy of 1 Gm every six hours. These patients had their last dose of neomycin eight days, 38 days, and six days respectively before the small bowel biopsy was performed. It is possible that neomycin was the cause of the morphologic changes in two of these patients. Three other malabsorbing patients from Group I, with normal biopsies, had also been taking neomycin, but they had their last doses 25 days, nine days and 11 days prior to the absorptive function tests and small bowel biopsies.

Because we did not perform aspirates of the small bowel for bacterial cultures, we cannot rule out abnormal bacterial flora for a possible cause of malabsorption. Schilling's test will usually be abnormal in the presence of bacterial overgrowth, and in the five malabsorbing patients tested, only one had an abnormal result. This patient's findings were consistent with pernicious anemia rather than bacterial overgrowth, as a normal urinary level of vitamin B12 was obtained when oral vitamin B12 was given with intrinsic factor.

Bile salts analysis was not performed. Although malabsorption has been shown to occur in anicteric patients with alcoholic liver disease,[10] the question of qualitative changes in the bile salts of cirrhotics is yet to be resolved. Some feel that impaired conjugation of the bile salts could cause the malabsorption in these patients.[11] Unconjugated bile salts have been shown to have a toxic effect on the mucosa of the small bowel.[18]

It has been shown that patients with cirrhosis have almost complete absence of biliary deoxycholic acid.[19] These authors hypothesize that this almost complete absence of biliary deoxycholic acid in cirrhotic patients could be due to abnormal intestinal flora, reduced absorption of secondary bile acid in the colon, or inability of the diseased liver to extract, conjugate, or excrete deoxycholic acid.[19] Badley *et al.*[20] concluded that steatorrhea associated with chronic liver disease was due to an intraluminal deficiency of bile salts. They showed that patients with chronic liver disease had subnormal bile salt concentrations and incorporated significantly less lipid into the micellar phase than did the control groups. No difference was found in the amount of triglycerides converted to fatty acids, suggesting that pancreatic function was normal.

There was poor correlation between small bowel mucosal atrophy and steatorrhea, with only two out of ten patients with both mucosal abnormalities and steatorrhea. One of these two patients also had pancreatic insufficiency and had been on neomycin therapy eight days prior to his small bowel biopsy. These factors may account for his steatorrhea and mucosal atrophy. The other patient had steatorrhea and abnormal small bowel mucosa (slight edema, congestion, and recent focal hemorrhage), but he had strong evidence for portal hypertension.

We, therefore, found little evidence to support one etiologic agent for malabsorption in patients with alcoholic liver disease.

Our results can be correlated with the theory that portal hypertension is associated with malabsorption,

since 83 per cent of the malabsorbing cirrhotics tested had increased splenic uptake on liver scan. Only 20 per cent (1 out of 5) of the nonmalabsorbing cirrhotics had increased splenic uptake. It must be concluded at this time that there is probably a multifactorial etiology of malabsorption in patients with cirrhosis; evidence for any of the other etiologies listed above has been cited. We found no consistent finding to suggest a single underlying mechanism for these patients' malabsorption.

Summary

Fifteen patients with chronic alcoholic liver disease were evaluated for malabsorption. Seven out of 14 (50%) of the cirrhotics had steatorrhea. Pancreatic insufficiency, malnutrition, small bowel mucosal abnormalities, small bowel mucosal edema secondary to hypoalbuminemia, and oral neomycin therapy could not be shown to be the cause of malabsorption in a significant number of these patients. Five out of six (83%) of the malabsorbing cirrhotics tested had evidence of portal hypertension.

Malabsorption in cirrhotics is most accurately determined by fecal fat determination. D-xylose excretion and serum carotene levels are not good indices of malabsorption in these patients because of the increased possibility of false positive and false negative results.

Although oral neomycin therapy could be a possible cause of the small bowel mucosal changes in two of these patients, and two malabsorbing cirrhotics had evidence of portal hypertension and mucosal edema, seven patients had unexplained etiology of the mild mucosal atrophy of their small bowel.

Malabsorption in patients with chronic alcoholic liver disease is probably due to any one or a combination of etiologic factors discussed above.

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Carcinomatosis of the Meninges

Presenting With Aphasia

SHERMAN W. COLE, M.D., ***San Antonio, Texas***

SINCE CARCINOMATOSIS of the meninges was described by Eberth in 1870, many workers have written about this interesting condition. Carcinomatosis of the meninges is usually described as a diffuse spread of metastatic carcinoma cells over the leptomeninges of the brain and other parts of the central nervous system, without discrete nodular metastases in the brain itself. The primary lesion is usually a carcinoma of the stomach, lung, or breast.[11] As Fischer-Williams *et al.*[7] have described, the disease usually is characterized by a period of vague ill health, lasting between three months and one year before the onset of neurologic signs. Neurologic signs usually appear suddenly, leading to coma and death within three to five months. These neurologic signs include headache, visual failure, cranial nerve palsies, and varying degrees of dementia. Carcinoma cells are usually demonstrable in the cerebrospinal fluid (CSF). One finds an extensive surface spread of carcinoma cells in the subarachnoid space, and severe degeneration of the optic nerves, but with no discrete nodular deposit in the nervous system.

An interesting example of this disease was recently seen at this hospital. There were some major differences between this case and most cases of carcinomatosis of the meninges, which prompted this case report.

Case Report

A 62-year-old white female, admitted to KUMC on May 20, 1971, had been exposed to measles in early April 1971, followed in the last week of April 1971 by a febrile illness, characterized by high fever, nausea, vomiting, diarrhea, anorexia, and delirium. By April 30, 1971, these symptoms had abated, but she was observed to be confused and unable to talk; relatives related that she seemed to know what she wanted to say, but her speech was incoherent.

She was hospitalized for five days, and her symptoms almost completely resolved. A week later, the confusion and aphasia returned, and she was rehospitalized.

Her past medical history was generally non-remarkable. She had been treated with thyroid extract for a "thyroid condition" until six months prior to admission.

At physical examination, the patient presented as an emaciated, elderly white female, who seemed to be confused. The neurological examination revealed normally active deep tendon reflexes, except for a slightly hypoactive left knee jerk. Hoffman's reflexes were present bilaterally, but Babinski's reflexes were absent. The cranial nerve functions were found to be intact. The senses of touch, pain, and proprioception were intact, but there was questionably decreased vibratory sensation on the lower left extremity. Finger-to-finger, finger-to-nose, and heel-to-shin tests were performed satisfactorily, and gait was within normal limits. On examination of higher functions, the patient exhibited both receptive and expressive aphasia. She was oriented to person, place, and time. There were paraphrasic and substitutional errors, and she was unable to name symbolic objects or to understand longer sentences.

Initial urinalysis and blood count were within normal limits. On initial lumbar puncture, clear, slightly xanthochromic fluid was obtained, but the opening pressure of the CSF was negative, and the fluid had to be aspirated. Laboratory studies disclosed the following values: white blood cell count (WBC) 9/cu mm; red blood cell count (RBC) 222/cu mm; glucose, 46 mg per cent; protein, 64 mg per cent; the Kolmer Serology, non-reactive; the colloidal gold, 0001221000. Gram stain, culture, India ink stain, and acid fast bacilli smear were all negative. On subsequent examinations of the CSF, WBC values ranged from 11 to 77/cu mm, with the WBC count showing a predominance of mononuclear cells, 70 to 100 per cent. RBC count ranged from 0 to 480/cu mm. CSF glucose values ranged from 30 to 58 mg per cent, while protein varied from 64 to 216 mg per cent. On each occasion, CSF gram stain, culture, India ink stain, and acid fast bacilli smear were all negative.

Electroencephalogram (EEG) obtained shortly after admission showed focal high amplitude slow activity over the left temporal and left frontal-temporal area, with a frequency of 3 to 5 cycles per second.

The patient had numerous x-ray examinations during her hospitalization. Initial chest x-ray revealed bilateral pulmonary apical infiltrates. This

x-ray evidence for pulmonary tuberculosis, together with the history of exposure to tuberculosis, led to the speculation that the patient might be suffering from tuberculous meningitis. Laminograms of the lung apices reinforced the diagnosis of tuberculosis; they showed some evidence of cavitation. X-rays of the internal auditory canals were within normal limits. Pneumoencephalogram showed generalized cerebral atrophy, but no evidence of a mass lesion or tumor. Initial brain scan was abnormal, with an area of increased uptake of isotope in the left temporal-occipital area. However, two subsequent brain scans —one obtained 22 days after admission and another 38 days after admission—were both normal. Right carotid artery and left vertebral artery arteriograms were normal; the other two major vessels were not studied due to technical difficulties. Intravenous pyelograms and barium enema were normal.

As was mentioned above, on admission, the patient was thought to be suffering from tuberculous meningitis. Thus, antituberculous therapy was instituted with isoniazid, streptomycin, and prednisone. However, after several weeks of such therapy, the patient showed only a slight decrease in her confusion. Also, because cultures and smears from both sputum and CSF were negative, the diagnosis of tuberculous meningitis seemed less likely.

During the course of the illness, cytological studies were performed upon the CSF, with the discovery of malignant cells. After this finding, it was felt that the patient's symptoms were probably due to metastatic disease of the central nervous system (CNS). Attempts were made to find a primary lesion, but none was found.

In the latter days of the hospitalization, the patient became ataxic, which was thought to be due to either streptomycin toxicity or a cerebellar lesion. Caloric studies revealed bilateral reduction in caloric response, which reinforced the diagnosis of streptomycin toxicity. She also developed urinary retention and fecal incontinence.

Cisternal tap was performed to obtain cisternal fluid with the following results: the CSF pressure, negative (as it had been in the lumbar punctures), the fluid showed pleocytosis, elevated protein, and decreased glucose levels. A few days before the patient's demise, she gradually became obtunded. A left frontal brain biopsy was performed on July 1, 1971. Postoperatively, the patient became more somnolent, and quietly expired on July 3, 1971, 43 days after admission.

At autopsy, the patient's weight was 44.5 kg (98 lb). Examination of the lungs revealed bilateral apical scarring, but there was no evidence of active granulomatous disease. A subpleural white mass of 0.5 cm was found in the right upper lobe, thought to be a tumor *(Figure 1)*. Both apices contained

Figure 1. Portion of upper lobe of right lung, showing the tumor, which is subpleural in location.

firm, gray-white, granular areas, the left measuring 3 x 0.5 cm., the right measuring 4 x 2 cm.

On examination of the nervous system, there was herniation of both cerebellar tonsils and both unci. A small amount of blood was covering the superficial fronto-parietal surface of the left hemisphere, and the biopsy site in the second left frontal gyrus was filled with blood. Very mild central hydrocephalus was present. There was no gross evidence of tumor.

Microscopic examination of the nervous system revealed the leptomeninges *(Figure 2)* to be heavily infiltrated with bizarre, anaplastic tumor cells similar to the cells seen in the apex of the right lung *(Figure 3)*. The brain itself was very superficially invaded, particularly the cerebellum. The meninges surrounding the spinal cord also contained tumor cells. There were no gross tumor nodules in the brain.

Microscopic examination of the lungs failed to reveal any evidence of old or recent tuberculosis. Focal acute bronchopneumonia was present in the right lower lobe. The small mass in the right upper

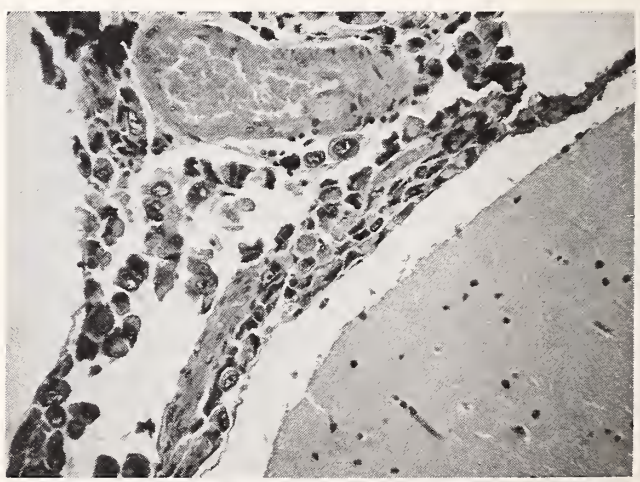

Figure 2. Microscopic section of brain and meninges, showing infiltration of meninges by tumor cells.

lobe was microscopically diagnosed to be adenocarcinoma *(Figure 3)*.

Discussion

Aphasia was the most striking clinical finding in this patient. Such aphasia is usually caused by a focal lesion in the speech area of the cortex. Such a lesion can be due to head injury, or it may be a space-occupying mass, or a vascular lesion.[2] However, in this patient, autopsy revealed no such focal lesion. Thus, when the actual pathologic process was generalized the patient's aphasia was a "false localizing sign," indicating a focal neurologic lesion.

Carcinomatosis of the meninges was the lesion found in this patient; however, many of the characteristics of carcinomatosis were noticeably absent. Headache is one of these. In each of the three cases described by Fischer-Williams *et al.*,[7] and in three of the four cases described by Dinsdale and Taghavy,[4] headache, often severe, was one of the presenting complaints. Severe headache was present in the patient originally described by Eberth.[6] This headache may produce the picture of general distress so characteristic of patients with carcinomatosis. "The headache is frequently severe and intractable and may be described by the patient as bursting or throbbing, affecting any part of the head, and often associated with pain at the back of the neck. This headache may be so severe that the patient becomes demoralized, abusive, and noisy," as described by Fischer-Williams *et al.*[7] The lack of complaints of headache in our patient, along with her quiet, almost withdrawn behavior, was very striking.

Another usual feature of this disease, also absent in our patient, is involvement of various cranial nerves. Signs of cranial nerve involvement were present in all of the three cases of Fischer-Williams *et al.*[7] These authors have pointed out that the most frequently affected cranial nerves are those of the extraocular muscles, particularly the sixth. Internal strabismus was present in Eberth's original patient.[6]

Many authors have pointed out that blindness is a common, very striking symptom in this disease. Heathfield and Williams[13] have described the other diagnoses which one must consider when presented with blindness of sudden onset in later life—the other causes being temporal arteritis with bilateral thrombosis of the central retinal arteries, vascular lesions of the brain causing bilateral occipital lobe infarction, and retrobulbar neuritis. Visual field examinations were performed on our patient, confirming the finding that her vision was intact. The absence of blindness in this case of carcinomatosis makes this patient somewhat unique.

Common physical findings in patients with carcinomatosis are abnormalities of the deep tendon reflexes. There was depression of ankle jerks in one

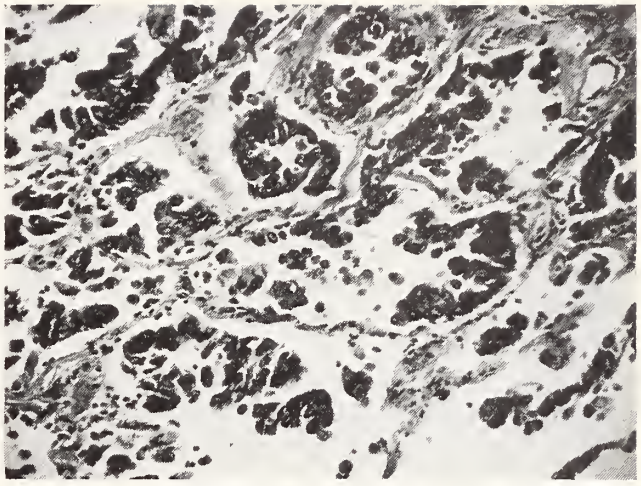

Figure 3. Microscopic section of lung showing the proliferation of tumor cells.

case described by Fischer-Williams *et al.*,[7] diminution of the right biceps, left triceps, right knee and ankle jerk reflexes in the second patient; and general weakness of the right leg in the third patient. Golding[10] has described a patient with carcinomatosis who presented with back pain. This patient eventually developed absence of tendon reflexes in the upper extremities, partial anesthesia in the forearms, absent abdominal reflexes, weakness in the leg muscles, and absent knee and ankle jerks. On repeated neurological examinations during her hospitalization, our patient on most occasions demonstrated deep tendon reflexes which were entirely within normal limits.

Dixon *et al.*[5] have used these various symptoms and signs to classify carcinomatosis patients into three groups: (1) with a slow development of symptoms, suggestive of a cerebral tumor; (2) with involvement of the spinal and basal meninges; and (3) with a rapid course resembling leptomeningitis.

During CSF examinations of patients with carcinomatosis, the opening pressure is found to be either normal or increased. Dambska *et al.*,[3] have described increased pressure in the cerebrospinal fluid as being part of the characteristic clinical picture of the disease. Our patient was unusual in this, since there was essentially no pressure at each examination of the CSF. Such a phenomenon could be caused by the tumor cells blockage about the spinal cord, but this was not substantiated at autopsy. Thus, the lack of pressure to the CSF is another puzzling aspect of this case.

That this was indeed a case of carcinomatous meningitis was borne out by the autopsy findings of tumor cells infiltrating the meninges in the absence of nodular metastases, as well as by the presence of malignant cells in the CSF. Other clinical data are consistent with the diagnosis of carcinomatosis. This patient demonstrated low CSF glucose values (30

to 58 mg per cent), which is common in this disease. Berg[1] reported CSF glucose values of 40 mg/100 ml or less in 33 of 46 patients. Kilpatrick and Pankey,[15] in a review of 58 cases of carcinomatosis, found that 45 cases (78%) had CSF glucose values of 40 mg/100 ml or less.

Fishman[8,9] studied two patients with low CSF glucose secondary to carcinomatosis. He infused a 50 per cent glucose solution intravenously and recorded the change in CSF glucose level. He found that the CSF glucose level failed to rise significantly in the patients with carcinomatosis, unlike the control patients. On this basis, he concluded that the low CSF glucose was related to a defect in entry into the CSF; the changes in the meninges, infiltrated with neoplastic cells, interfere with a transport mechanism in these membranes adjacent to the CSF.

Some authors have contended that the predominant cause of low CSF glucose levels in this disease is increased glucose utilization by tumor cells. Levinsky[17] writes: "The utilization of sugar by hungry, actively growing tumor cells seems the most reasonable explanation, perhaps enhanced by the effects of mechanical blockage." But recent writings have supported Fishman's view. Kim and Resnick[16] summarized the evidence as follows: "Although it may be that neoplastic cells have a much greater rate of glycolysis than leukocytes and bacteria, and it is possible that under certain conditions neural tissue, meninges, leukocytes or bacteria increase their rate of glycolysis, . . . experimental observations, as well as the small number of tumor cells found in the CSF of the present case, suggest that decreased rate of entry of glucose into the CSF might be a major mechanism of the hypoglycorrhachia and one that is common to several varieties of disease involving meninges."

If one accepts Fishman's hypothesis that the tumor cells inhibit the transport mechanism which normally carries glucose to the CSF, one can postulate the possible presence of a cerebral "starvation" as a cause of the coma and death which occurs in these patients. It is the contention of this writer that as the glucose is prevented from entering the CSF, CNS cells have insufficient glucose to metabolize. This explains the various symptoms and eventual coma and death which occur.

This case was similar to many others, in that it was initially thought to represent tuberculous meningitis. Hughes *et al.*[14] have commented on the similarity of the clinical pictures in the two diseases. They point out that moderate CSF pleocytosis with a high percentage of "round cells," a marked rise in CSF protein content in comparison with the cell count, and a significant fall in CSF sugar content are present in tuberculous meningitis, as well as meningeal carcinomatosis. However, they also delineate three major differences between the two conditions. Patients with carcinomatosis of the meninges, unlike those with tuberculous meningitis, are usually fully conscious even when quite ill; they are afebrile, and the tendon reflexes are either absent or diminished. One notes that our patient actually corresponded to only one of these three differential criteria; she was afebrile, but she did become quite comatose, and her deep tendon reflexes were present and normal. In view of the reports of many authors, that their patients with carcinomatosis became comatose, one must question the contention of Hughes *et al.,* that patients with this disease are "fully conscious."

Dixon *et al.*,[5] have described another difference between the two diseases; the fibrin clot, characteristic of tuberculous meningitis, is usually not present in carcinomatosis.

Most patients with carcinomatosis are not treated, or are treated for the wrong diagnosis. However, Heathfield and Williams[13] have reported a case treated with irradiation with some success. Their patient presented initially with headache, blindness, and sciatic pain. Initial irradiation produced good relief of symptoms, and on several occasions, when symptoms recurred, remission was obtained with irradiation; death did not occur until three years after onset of symptoms.

Hawkins and Brown[12] reported a case treated with amethopterin, but there was no alteration in the course of the disease.

Summary

This paper has included a description of a case of meningeal carcinomatosis which presented with confusion and aphasia. Like most other cases of carcinomatosis, malignant cells were found in the CSF, the CSF glucose level was decreased, the patient was afebrile, and at autopsy a diffuse infiltration of carcinoma cells was found about the meninges of the brain and spinal cord. But unlike other cases, the patient presented with aphasia. In addition, unlike other cases, the patient did not present with headache; there were no visual or other cranial nerve signs; there were no abnormalities of the tendon reflexes, or limb weakness, and the primary lesion was not readily apparent before death. One concludes that this patient represented a somewhat unusual clinical manifestation of this disease.

The hypothesis is presented that the signs seen in patients with this disease, including the coma and death, may be due to an insufficient quantity of glucose available for CNS cells to metabolize.

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(Continued on page 440)

"Step Over Gait" Correction

Internal Rotation, Flexion and Adduction Deformity of the Hip

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Corrective surgical procedures undertaken to make the child "more normal," though not monumental in effect, are welcomed by the child and his parents. Thus, correction of the internal rotation, flexon, and adduction deformity of the hip which produces the "step over gait," the typical lumbering gait, is one factor in improving the child's appearance. This gait is one of the common lower extremity deformities and may be due to femoral anteversion in association with hypertonic hip flexor and adductor muscles.

CEREBRAL PALSY must be recognized as a total-child problem involving all realms, such as the mental, physical, psychological, speech, and hearing. The more severe the handicap, the earlier this deformity becomes evident and the longer the problem has been present, the more rigidly established does the gait pattern become and the more difficult is its correction. This gait may discouragingly persist or even increase despite attempted correction with soft tissue procedures, such as iliopsoas or adductor tenotomy, obturator neurectomy, myotomy, or tendon transfers.

Sutherland[3] stated femoral anteversion frequently occurred after medial hamstring tendon transfer. In his study of seven children (the oldest was 12), the offending medial hamstring muscles were determined by electromyographic studies superimposed upon cinematography of the patient's gait. The tendons of these muscles were transferred to the lateral aspect of the femur. In this manner, internal rotation due to anteversion was corrected in younger patients without resorting to femoral osteotomy. He stated that older children might have difficulty in adapting to this change in muscle balance. For this group he recommended osteotomy, which resulted in greater improvement and avoided the knee instability and recurvation which occasionally follows medial hamstring transfer.

Banks and Green,[1] evaluating the results in 89 patients operated upon for adduction contracture, noted some internal rotation deformity in all patients with severe adduction and scissoring. Only 15 had a marked internal rotation contracture. In their opinion, hamstring and adductor muscle spasticity was the significant factor in producing this deformity. They recommended correction by adductor tenotomy, obturator neurectomy, and prolonged postoperative plaster splinting and intensive physical therapy.

A cerebral palsy axiom states that the least involved patients will achieve the best surgical results. Beals[2] studied 315 patients who had spastic paraplegia and diplegia, and evaluated the surgical results in 111. He developed the following generalizations: (1) the less the motor involvement, the better the result; (2) the older the patient, the less chance of deformity recurrence; and (3) bony procedures consistently maintained correction obtained at surgery. The conclusions are substantiated by our study of children treated for the "step over gait."

We have tried many soft tissue procedures, with various degrees of success or failure, for correction of this problem. We finally found that bony correction by means of a femoral intertrochanteric rotational osteotomy produced the most consistent and rewarding results. Indeed, in nine of our 20 patients undergoing osteotomy, 33 soft tissue procedures had failed to correct the problem. These procedures included adductor or iliopsoas tenotomy, obturator neurectomy, and hamstring tendon transfers. The hamstring tendon transfers were either a variation of the Eggers procedure or a transfer of the medial hamstring tendons to the lateral femoral condyle. In 11 patients, osteotomies were performed as a primary procedure.

We do not operate on all children treated for the "step over gait." A child with good balance and a mild deformity not cosmetically objectionable cer-

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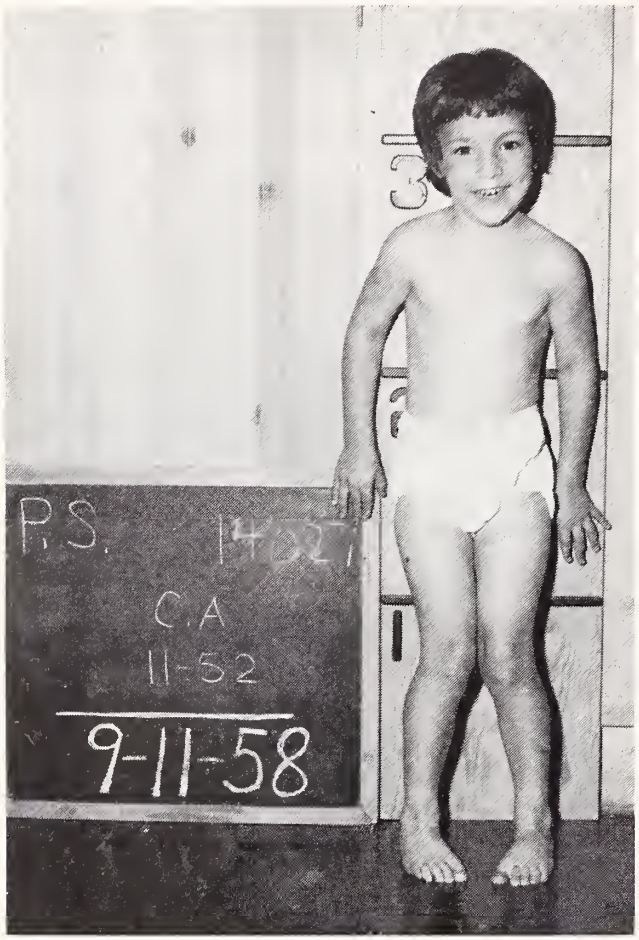

Figure 1. Six-year-old patient with spastic diplegia. Note internal rotation and adduction deformity of hips. Also note "crouched" stance due to hypertonic hip flexors and medial hamstring muscles.

tainly does not need surgery. Aggressive physical therapy, supplemented at times with twister braces, is the treatment of choice for these children. This usually maintains the status quo, although we have never seen it correct the deformity. On the other hand, a child handicapped by restricted stride length, poor balance, and an awkward "step over gait" should be considered for surgical correction.

The children in our series were of three types: spastic, athetoid, and rigidity. The spastics were further classified into quadriplegics, diplegics, paraplegics, and hemiplegics. The diplegics have quadriplegic involvement but with more severe involvement in the legs.

Selection of Cases

Between 1956 and 1970, 27 intertrochanteric rotational osteotomies of the femur were done for internal rotation, flexion, and adduction of the hip which produced the "step over gait." This represents less than 1 per cent of the children seen, and indicates the high degree of selectivity used in choosing cases. All children had received extensive physical therapy prior to surgery, and all had demonstrated at least an encouraging degree of standing balance. Selection was based on the following:

(1) A degree of deformity interfering with mobility, stability, appearance, and an absence of a fixed deformity.

(2) Recurrence of deformity after attempted soft tissue correction.

(3) Mental capabilities sufficient to cooperate in postoperative rehabilitations.

(4) Absence of medical problems which might complicate recovery; *e.g.*, convulsions or respiratory problems.

(5) Presence of stable hips.

(6) Age.

These criteria gradually evolved as we gained experience with procedures, and some of our earlier cases would not at this time be considered candidates. These failures led us to a more careful selection and, thus, to better results.

There were 20 patients (nine males and 11 females), and seven children underwent bilateral procedures, making a total of 27 procedures. The patients have been followed for one to 14 years, the average being five and one-half years. The ages at surgery varied from five to 16 years, the average being 11 years.

Surgical Procedure

A lateral approach to the trochanteric region was used. Once the femur was adequately exposed, two small drill holes were made anteriorly in the midline, one on each side of the proposed osteotomy site. These are markers to determine the amount of rotation corrected. A Blount blade plate, or Jewett nail, was then driven into the femoral neck over a previously inserted guide pin introduced under x-ray control. This internal fixation was loosely clamped to the femoral shaft, Gigli's saw passed above the lesser trochanter, and the osteotomy performed. The femoral shaft was then rotated into 45° of external rotation and stabilized by attaching it to the internal fixation.

Early in our series, fixation with Steinmann's pins was attempted in five hips. The proximal pin was inserted through the trochanter into the head and neck prior to the osteotomy. The second pin was inserted into the femoral shaft just distal to the osteotomy after correction of the rotation. These pins were left protruding through the skin and were incorporated in the plaster hip spica for stability. This method did not provide adequate stability. Our original case was immobilized in a plaster hip spica without internal fixation, and this failed. One case stabilized with a bone plate failed when the plate fractured.

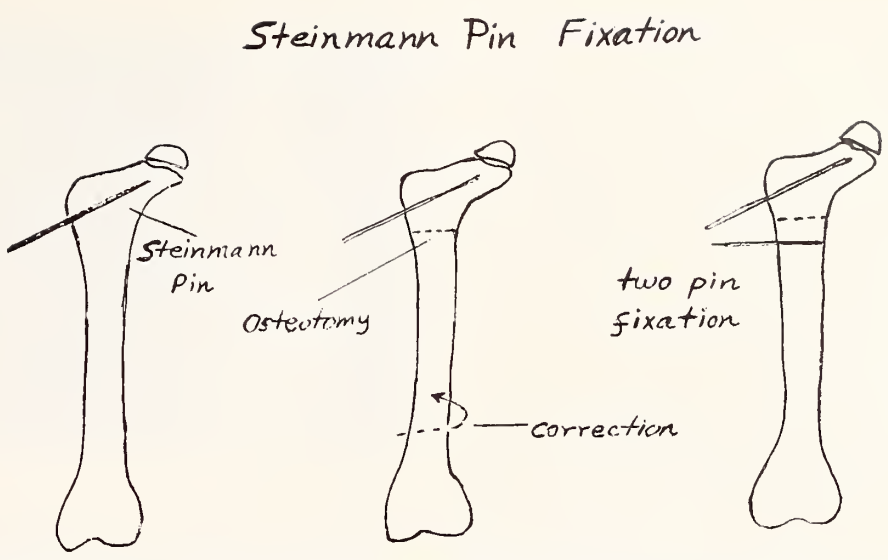

Figure 2. Schematic diagram of steps involved in osteotomy with Steinmann's pin fixation. This type of fixation has been abandoned in cerebral palsy patients.

Bilateral hip osteotomies were usually performed ten days apart.

Each child was placed in a plaster hip spica for a minimum of six weeks. Casts were discontinued when solid bony union was evident on x-rays, and physical therapy was then started.

Results

Results were evaluated according to the following criteria, which are admittedly subjective, and it is difficult to avoid personal bias:

(1) Correction of internal rotation and adduction deformity.

(2) Improvement due to correction of "step over gait."

(3) Improved balance.

(4) Ability to ambulate with less external support and with increased stamina.

(5) Patient or parental opinion of result.

Based on these criteria, the following categories were established to assess results:

Good: Ambulation markedly improved; no internal rotation, flexion or adduction; improved balance.

Fair: Ambulation improved but with residual internal rotation and slight tendency to adduction; improved balance.

Unimproved: Those not significantly benefited, but not made worse.

Failure: Those patients made worse by the procedure or a complication.

Ten patients of the 20 were rated as good; five were bilateral. Four patients were rated as fair; one

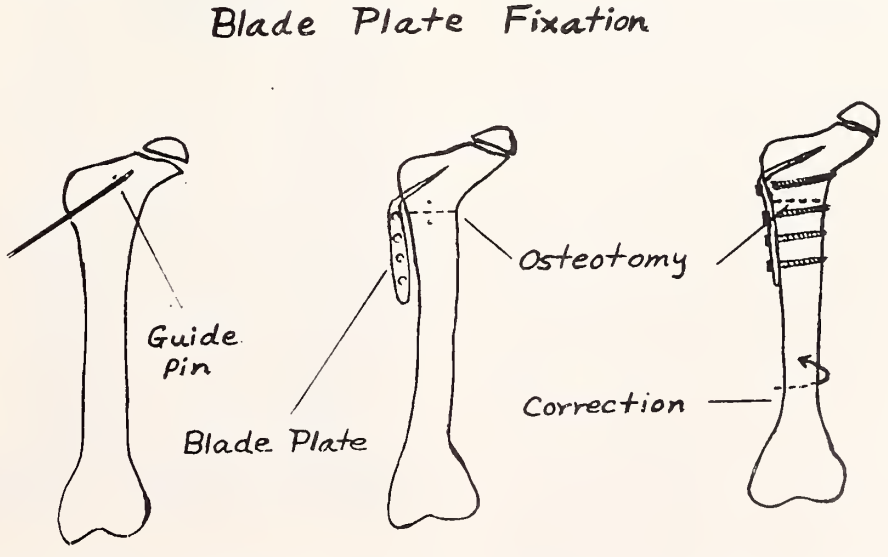

Figure 3. Schematic diagram of blade plate technique for femoral intertrochanteric osteotomy. This type fixa- has been abandoned in cerebral palsy patients.

was bilateral. Two were unimproved; none were bilateral. Four patients were failures; one was bilateral.

All ten patients rated as good are ambulatory without walking aids or bracing. Seven are spastics, and three are athetoid. All of these patients have normal or near-normal intelligence. The seven spastics include one quadriplegic, four diplegics, one paraplegic, and one hemiplegic.

Four patients were classified as fair; two were spastic diplegics and two were athetoids. One child of each type had mild mental retardation, and the two athetoids had speech and hearing handicaps. One spastic diplegic used crutches prior to surgery due to a congenital dislocation of his hip on the more involved side, which had been treated by an iliac osteotomy. The osteotomy corrected his gait and, although he still used Lofstrand crutches for support, he was better. A spastic diplegic who underwent bilateral procedures also was rated fair. In this case, one femoral shaft was placed in excessive external rotation. The patient still walks toeing out. He had, however, the most pronounced "step over gait" preoperatively, and this had been overcome.

Two patients were unimproved. One was a severe spastic quadriplegic with mental retardation. The prognosis for independent ambulation was poor, but surgery was undertaken to facilitate nursing care and in the hope of obtaining some limited ambulation. Nursing care was simplified, but ambulation was not gained. His condition remained essentially unchanged. The other patient had normal intelligence. In his case, inadequate fixation was obtained with a bone plate and screws which broke during his convalescence. These were replaced, but correction had been lost and the hip remained in 30° of internal rotation.

Four patients were failures. Three were severely mentally retarded. One had a rigidity secondary to toxoplasmosis. The skull x-rays showed diffuse calcific stippling with premature closure of the suture lines. At eight years of age, internal fixation with a small Blount plate was attempted, but the small femoral neck prevented this. The patient was immobilized in plaster without internal fixation and developed a marked valgus neck similar to Schanz's osteotomy. The rotational deformity was corrected. Four years later, the hip dislocated. In retrospect, this patient was a poor candidate because (1) he was too severely handicapped; (2) he was skeletally too young; and (3) internal fixation was not used.

A second failure, a severe spastic quadriplegic, blind, and severely mentally retarded, was ambulatory in short leg braces with sawhorse crutches and with constant help. Improvement in limb position resulted, but his preoperative level of ambulation was never regained. He was a poor candidate for surgery.

The third failure, a spastic hemiplegic, has not walked as well since surgery. His postoperative overall alignment is satisfactory and he has received daily physical therapy, but the function of the leg has remained poor. He now requires more support when walking. The reasons for failure are obscure.

The fourth failure, a spastic quadriplegic, was eight years old and had mild mental retardation. Initially the gait was improved, although a varus deformity of the neck occurred postoperatively. This corrected spontaneously during the following year. The internal rotation recurred plus a 30° flexion contracture during the next five years.

Complications

Six patients suffered seven complications. One developed an infection around the Steinmann's pins. This necessitated premature removal of the pins three weeks postoperatively, and bony position was lost.

In five patients, loss of bony position occurred postoperatively. One patient, immobilized in plaster without internal fixation, has been described. Two patients developed a varus deformity following removal of Steinmann's pins. One patient was previously discussed. In another patient, the pins were removed at six weeks. She then developed a mild varus deformity which corrected spontaneously in one year. In one patient already described, internal fixation was inadequate and the bone plate fractured during convalescence. The plate and screws were replaced, but the rotational correction was lost. Varus deformity occurred in one patient due to improper insertion of the blade plate, and the osteotomy held at an angle of 90°. A fracture through the osteotomy site on the opposite side occurred after removal of the blade plate ten months postoperatively, and a varus deformity developed.

Pressure sores developed over the anterior iliac crests and sacrum of one patient. These required debridement and secondary closure. This delayed physical therapy, but there were no other problems.

Discussion

Twenty-one intertrochanteric osteotomies (15 patients) were done by the senior author, and six osteotomies (five patients) were done by other orthopedic surgeons. The evaluation of all patients was performed by the authors.

In patients with cerebral palsy, corrective operations on the bones consistently produce more permanent and lasting results than do soft tissue procedures. Nine patients had had soft tissue procedures which failed to correct the "step over gait." We believe femoral osteotomy should be considered in carefully selected cases where this has occurred. In 11 patients, the decision to do an osteotomy as a primary procedure was based on our previous expe-

Figure 4. Radiograph of hips showing completely healed osteotomies with internal fixation device in place. Note valgus configuration of neck on right. This is a common finding in spastic cerebral palsy involving the lower extremities.

Figure 5. Later photograph of patient in *Figure 1.* Now 18 years old, and 5 yrs. 9 mos. following bilateral rotational osteotomies of the femur. Note normal alignment of the lower extremities.

rience and the evolution of certain criteria and the results we had obtained.

The minimum six-week postoperative period in a plaster hip spica, besides protecting the osteotomy during the healing period, has other beneficial effects. The cast is applied with the hip in wide adduction and no flexion. This stretches the hypertonic flexor and adductor muscles, and on resumption of weight bearing the corrected stance which results from the osteotomy, maintains this correction.

We observed that children operated on before the age of ten may develop a recurrence of the "step over gait." Usually this is mild, and the gait is not seriously affected. Candidates for this procedure, therefore, should be at least ten years of age. This also permits one to deal with bones of larger size, which allows adequate internal stabilization. X-rays revealed that younger children also tend to spontaneously correct any varus deformity of the neck which may have resulted.

Five patients were athetoids. Surgery is less often indicated in athetoids as the gait pattern tends to be fixed, and this pattern tends to recur following bony or soft tissue procedures. However, in our series, femoral osteotomy was beneficial in carefully selected athetoid children with a "step over gait." Indeed, some of our happiest results were in athetoids.

An important factor to remember in these children is the absence of fixed deformities, especially adduction and flexion. The procedure is designed only to correct anteversion of the femoral neck in association with hypertonic flexor and adductor muscles.

In our ten good cases, patient, parent, and doctor were pleased with the results. In all other cases, there were various degrees of satisfaction or dissatisfaction on the part of patient, parent, or physician, and the opinions frequently did not agree. Parents and patients usually believed the results to be better than did the physician.

Certain cardinal points are evident from this study:

(1) There must be proper selection of cases based on criteria previously enumerated. All of the failures and one unimproved case were poor candidates due to total handicap.

(2) Solid internal fixation must be obtained, as most complications are due to loss of bony position.

(3) Plaster immobilization must be utilized for a minimum of six weeks to guard against the risk of internal fixation cutting out of the bone, and of screws pulling, especially true when the child has a pronounced startle reaction.

(4) Physical therapy is crucial, and surgery must not be undertaken unless therapists know-

ledgeable in the treatment of cerebral palsy are available.

(5) One year is usually required for rehabilitation. This should be thoroughly discussed and understood by the parents and patient prior to surgery.

Summary

Twenty-seven intertrochanteric femoral osteotomies were performed on 20 children with cerebral palsy for "step over gait."

The procedure is indicated when soft tissue procedures fail or the deformity is judged too severe to benefit from soft tissue procedures.

The results were: good, 10; fair, 4; unimproved, 2; failure, 4.

The most frequent complication was loss of bony position due to inadequate internal fixation.

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Amniotic Fat Embolism

New Laboratory Diagnosis and a Case Presentation

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THE SYMPTOMS of pulmonary microembolization require immediate diagnosis and treatment if a fatal outcome is to be averted. The symptoms, classically brought on by fat embolization, can also be caused by amniotic fluid embolism with equally undesirable results. The diagnosis of amniotic embolization, however, is very difficult to ascertain, especially by laboratory tests, with the exception perhaps of direct investigation of squama and lanugo in the peripheral circulation.[1] The fat component of the amniotic fluid has been neglected both as embolizing particle and as a clue for diagnosis. Therefore, we have applied our procedures for the diagnosis of posttraumatic fat embolism to a patient with a postpartum embolic syndrome.

In this communication, we present the case report along with our unpublished methods for the qualitative investigation of fat in urine, sputum, and our fat-particle counting technique in the venous blood.

Case Report

A 28-year-old housewife was admitted to St. Francis Hospital, Topeka, Kansas, on July 5, 1972, for delivery of her first baby. Her membranes had ruptured the morning before and she was dilated 5 cm on admission. She delivered a 4½ lb baby at 10:43 a.m. The patient was well before the delivery, but had a slight cough during the delivery. Her blood pressure went up to 150/100 during labor, but returned to normal. She was returned to her room at 1:00 p.m. with a slight cough and feeling quite sleepy. At 1:35 p.m., she began chilling and requested blankets. At that time, her temperature was 97F (36C), and her pulse was 100. At 2:00 p.m., she was warm and dry, her skin was pale but her nailbeds were cyanotic. Chest x-ray revealed extensive pneumonia in the left upper and left lower lobe at 2:30 p.m. Blood pressure was 138/80; pulse rate, 118; respirations 32 per minute. She had some low abdominal pain and some pain in the middle of her back. Medical consultation was requested because of extensive pneumonia. Although petechia and Purtscher's eye sign were not present, the possibility of fat embolism was suspected, and a hematocytometer test for fat revealed 6 to 7 fat globules per cubic millimeter. She was started on Keflex every six hours, and intermittent positive pressure breathing (IPPB), with 30 per cent ethyl alcohol every two hours, resulting in prompt improvement of her breathing. On July 6, a four-view Pho/gamma camera lung scan was obtained on the Nuclear Chicago gamma camera, with Technetium albumin microspheres (human)* using a 3 millicurie dose. The four-view scan revealed definite perfusion defects in the region of the pneumonic infiltrates in the left lung, particularly in the region of the apex. This is best seen on the posterior view but is quite obvious on the lateral view. Urine examination was positive for fat and cryostat examination revealed granular fat substance. On July 7, sputum and urine examinations revealed fat and lipase, 2.3 units. Urine examination on July 8 again revealed fat globules. Lipase on July 8 was 1.1 units. Repeat chest x-ray

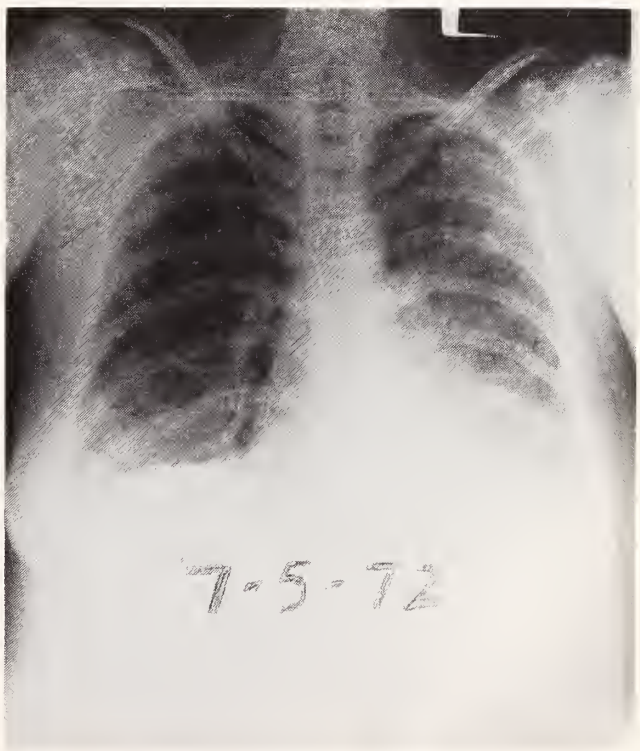

Figure 1

* 3M brand albumin microsphere 99 m Tc labeling kit.

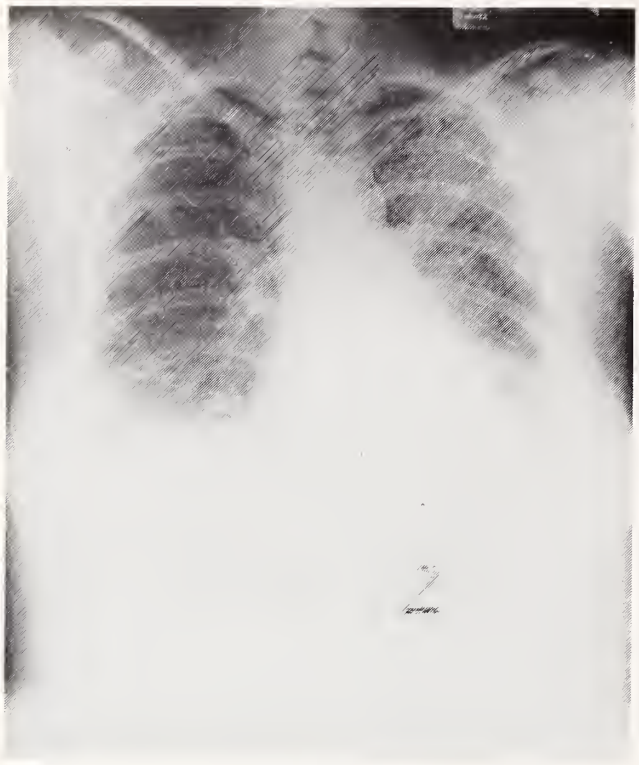

Figure 2

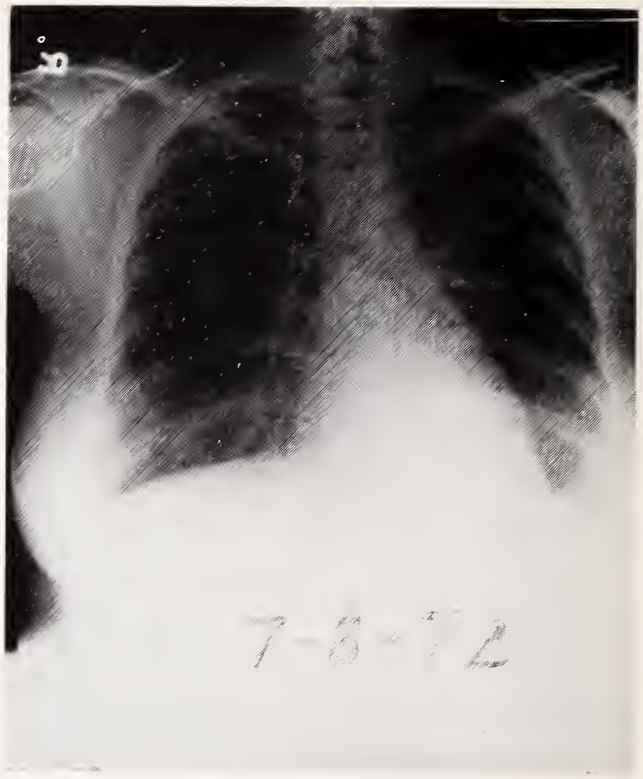

Figure 3

on July 10 revealed complete clearing of the pneumonia, and the right lung remained clear. A repeat lung scan on July 10 revealed a significant decrease in perfusion on the left lung with large defects in the apex and in the posterior basilar area, which corresponds to the areas of consolidation on the early chest films. There was some improvement when compared to the previous scan. Clinically, she improved within a few hours and has continued to get stronger. Sputum culture on July 6 revealed alpha hemolytic strep and Neisseria species.

Methods

The neutral fat appears as bright red material.

A. Investigation of fat in urine. The investigation is done on a random sample of urine.
   1. Transfer 15 ml of urine to a centrifuge tube.
   2. Add 5 drops of recently filtered oil red alcoholic solution; shake.
   3. Chill the urine for 1 hour in the refrigerator.
   4. Centrifuge up to 2,000 rpm for 5 minutes.
   5. Sample the very top of the supernatant with a capillary pipette or wire loop and deposit on a fat-free microscope slide.
   6. On microscopic examination, the neutral fat appears as irregular masses of bright red material. As a quality control, run a known negative urine and a positive control which could be prepared by adding some bone marrow material to saline solution.

B. Fat-particle counting in peripheral blood. Fat microemboli from a sample of anticoagulated blood is surfaced by centrifugation and counted in a Neubauer chamber, using a white cell dilution pipette and oil red diluting solution.
   1. Obtain 10 ml of venous blood in ethylenediaminetetraacetic acid (EDTA).
   2. Centrifuge at 3,000 rpm for 15 minutes.
   3. Using a white dilution pipette, draw plasma from the top of the plasma phase, up to the mark 1.
   4. Dilute with oil red staining up to the mark 11. The stain contains: 2 Gm of oil red powder, 50 ml of acetone, 50 ml alcohol 30 per cent, and 1 ml of concentrated acetic acid.
   5. Shake for 5 minutes.
   6. Fill a Neubauer chamber degreased with xylene.
   7. Let stand for 2 minutes.
   8. Count fat globules in all nine squares of the chamber. The fat globules appear as red-stained bodies usually attached to the cover slip. The markings of the chamber appear in the background. It is recommended that two chambers be counted for a volume of 1.8 cu mm of suspension.
   9. Calculations:
      Fat particles per cubic millimeter equals:
      $$\frac{1 \times \text{count} \times 10}{1.8}$$

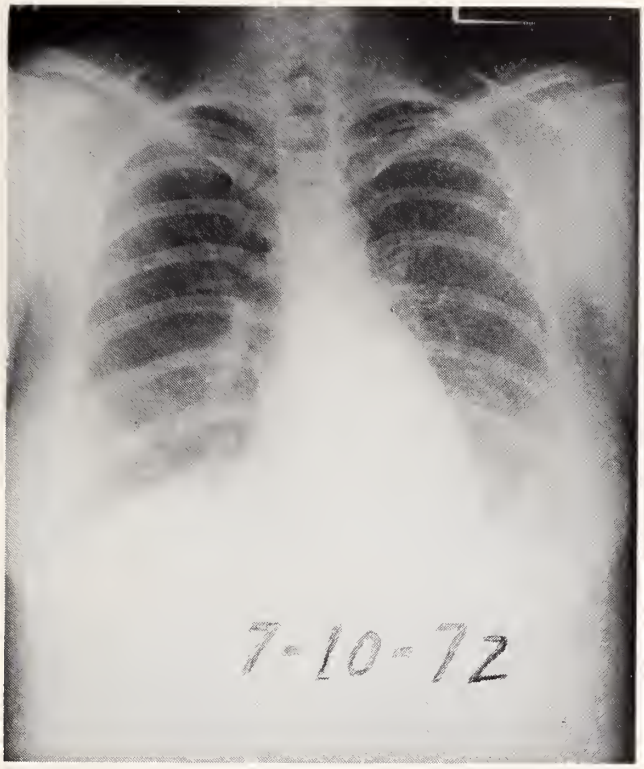

Figure 4

C. Cryostat test for fat embolism.[2] Ten milliliter of whole blood is allowed to clot. Then cryostat frozen sections are cut 10 microns thick at −20C. The slides are fixed in 70 per cent ethyl alcohol, then stained with 1 per cent alcoholic solution of oil red.

D. Investigation of fat in sputum using degreased microscope slides and wire loop.
   1. Prepare a thick sputum smear.
   2. Stain for neutral fat.[3]
   3. Examine under microscope.

E. Lung Scan
   1. Administer human albumin microspheres labeled with Technetium-99m (approximately a 3 millicurie dose). Observe the pulmonary circulation with a four-view PHO camera. Record by photograph as needed.

Comment

This interesting case presented two challenges: diagnosis and treatment. Clinically speaking, the first diagnostic possibility was amniotic fluid embolism; on the other hand, the clinical manifestations closely resembled the classical picture of the acute pulmonary fat embolization.[4] Therefore, considering that the amniotic fluid includes a significant fat component, it appeared logical that a confirmation of the fat embolization by laboratory methods would indeed be a confirmation of the amniotic fluid embolization. The counting of fat particles in the circulation revealed a relatively low count per cubic millimeter, but that is qualitatively abnormal. The subsequent investigation of fat in the urine and sputum was positive for several days. The cryostat test, which is usually adequate in the posttraumatic fat embolism syndrome, revealed granular fat and failed to demonstrate squama and lanugo. From the therapeutic standpoint, this case was immediately treated with ethyl alcohol used in intermittent positive pressure breathing. The clinical symptomatology receded within hours after the treatment was begun. Repeated chest x-ray films and lung scan revealed improvement in four days. Meanwhile, there was fat in the urine and sputum for several days after the clinical episode. The reason why the chest x-ray film and lung scan revealed extensive disease only in the left lung is still not apparent.

Acknowledgments

The authors express thanks to J. Zix for photographs.

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KUMC Trauma Conference

Traumatic Rupture of a Segmental Bronchus

Edited by **F. W. RECKLING, M.D.** *and*
ARLO S. HERMRECK, M.D., *Kansas City, Kansas*

Dr. Mahoney (Surgery Resident): The case for presentation today is a 40-year-old male who was involved in an automobile accident. The patient was not wearing a seat belt and was thrown from his vehicle. He arrived in the emergency room in shock with a blood pressure of 60/40 mmHg and a pulse rate of 104 beats per minute. He was in severe respiratory distress with paradoxical motion of the right anterior chest. Physical examination revealed extensive subcutaneous emphysema over the right thorax and neck, and absent breath sounds on the right side of the chest. Rib deformities as well as bony crepitus were also noted. The abdomen was tender with generalized guarding. A chest x-ray revealed multiple rib fractures and a hemopneumothorax on the right side *(Figure 1)*. A chest tube was placed in the right thorax with immediate drainage of approximately 300 cc of blood, and a massive air leak was also noted. The admission hematocrit was 45 per cent, arterial pH 7.16, PaO_2 and $PaCO_2$ 42 and 39 mmHg respectively. Because of the shock state and respiratory distress, the patient was immediately intubated with an endotracheal tube and transfused with two units of whole blood and three liters of Ringer's lactate, with an increase in the blood pressure to 90/50 mmHg. It was felt, however, that neither the blood loss from the chest nor the respiratory distress was adequate to explain the hypotension. A diagnostic peritoneal tap was then carried out by infusing 1000 cc of dialysate fluid to the peritoneal cavity. The return fluid was grossly bloody. Because of the positive peritoneal tap, a preoperative diagnosis of lacerated liver was made. The patient was taken to the operating room where an exploratory laparotomy revealed two large contusions of the greater omentum with no other gross injuries. There were no active bleeding sites or gross blood in the peritoneal cavity.

Dr. Reckling: How do you explain the positive peritoneal tap?

Dr. Mahoney: I really can't explain this. It is possible there was some bleeding initially from the contusion of the omentum which ceased spontaneously. Another possibility would be a traumatic tap.

Dr. Reckling: Would you comment on this, Dr. Hermreck? How often do you get a false positive tap?

Dr. Hermreck: First of all, one must define a positive tap for the diagnosis of hemoperitoneum. It takes only 5 cc of blood in a liter of saline to make it look grossly bloody, and, of course, this is considered a positive tap. It is not hard to conceive how one could pierce a small vessel while doing a peritoneal tap and get back bloody fluid. However, if the trocar is properly placed, this problem should be minimized. In most good series where a careful protocol is followed in performing the peritoneal taps, the incidence of false positive taps for hemoperitoneum is about 10 per cent.

Dr. Reckling: Where is the proper place for placement of the dialysis catheter?

Dr. Hermreck: About 3-5 cm below the umbilicus in the midline. This is a reasonably avascular area and the properitoneal fat is nearly absent in this area. If there has been previous surgery, however, a peritoneal tap should be avoided because of the possibility of penetrating the bowel.

Dr. Reckling: What did you do, Dr. Mahoney, when you explored the abdomen and found no major injury?

Dr. Mahoney: We closed the abdomen and took the patient to the intensive care unit. In the 24-hour period following laparotomy, he lost approximately two liters of blood from his chest tube, and also during this period he became febrile with a rectal temperature of 104F (39.8C). We continued to transfuse the patient to a total of six units of blood in addition to administering five liters of Ringer's lactate solution. He had to be maintained on a ventilator for respiratory support with inspired oxygen concentrations of 100 per cent to keep his PaO_2 around 50-80 mmHg. A large air leak persisted, which amounted to approximately 500 cc per breath.

Dr. Reckling: How do you measure an air leak, Dr. Hermreck?

Trauma Conference, November 1, 1971, at the University of Kansas Medical Center, 39th and Rainbow Blvd., Kansas City, Kansas 66103.

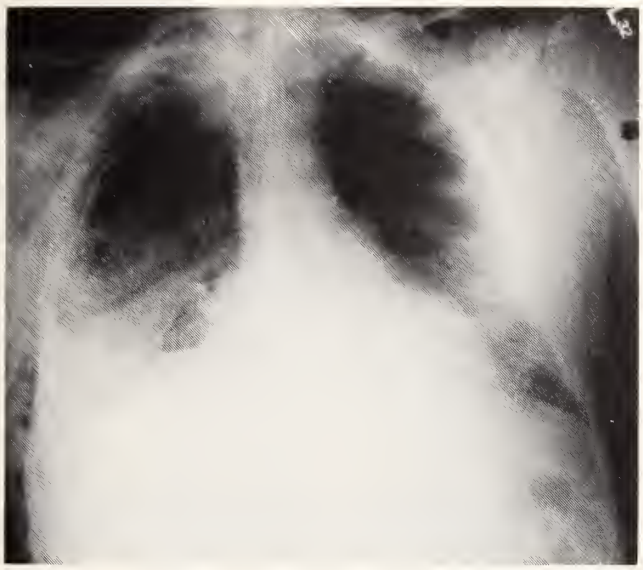

Figure 1. Chest x-ray shortly after admission. A right chest tube as well as an endotracheal tube are in place. An infiltrate is present in the right lower lobe. Note the extensive subcutaneous emphysema on the right side extending into the neck region.

Dr. Hermreck: This is quite easily done if you have a closed system such as a cuffed endotracheal tube and a ventilator with an expired air spirometer. Most modern ventilators, such as the Bennett MA-1, have a very accurate tidal volume regulator. One merely has to set the tidal volume at, say, one liter per minute, and then measure the expired volume. The difference between the two equals the volume of the air leak per breath.

Dr. Reckling: Dr. Mahoney, continue with the patient's hospital course.

Dr. Mahoney: On the second day, a tracheostomy was performed in order to provide for a better tracheal toilet. In addition, another episode of hypotension had to be treated with administration of blood. The patient's central venous pressure also became elevated (17 cm of water) despite the hypotension; therefore, he was digitalized. Over the next 24-hour period, he lost another liter of blood from his chest tube, and the large air leak persisted. At this time, we elected to carry out a right exploratory thoracotomy.

Dr. Reckling: What was your diagnosis prior to thoracotomy?

Dr. Mahoney: The preoperative diagnosis was transection of a major bronchus on the right side.

Dr. Hermreck: Was the patient bronchoscoped prior to operation?

Dr. Mahoney: Yes, the patient was bronchoscoped on two occasions, and the only positive finding was blood coming from the superior segmental bronchus of the right lower lobe.

Dr. Reckling: Dr. Thal, would you comment on the operative findings?

Dr. Thal: This was a very unusual injury to the lung. The patient had an avulsion of the superior segmental bronchus along with laceration of the blood vessels to the superior segment of the right lower lobe. I have not seen an injury which was so clearly segmental in nature. The remainder of the lung had likewise sustained a generalized injury as well. It was severely contused and hemorrhagic from the apex to the basilar segments. The patient had an enormous air leak due to the superior segmental bronchial avulsion, and also a massive hemothorax. The bronchoscopy which was carried out prior to thoracotomy, as has been mentioned, revealed blood in the superior segmental orifice, which was the tip-off that the bronchus was ruptured.

Dr. Reckling: What kind of a procedure was performed?

Dr. Thal: Because of the segmental nature of the injury, we were able to carry out a superior segmental resection of the right lower lobe, thereby conserving the remainder of the lobe.

Dr. Reckling: How has the patient done since his operation?

Dr. Mahoney: The patient has required continued respiratory assistance with the MA-1 ventilator and oxygen in order to maintain his PaO_2 between 50-70 mmHg. In addition, he developed bilateral pneumonitis and septicemia. Tracheal cultures as well as two blood cultures grew out Staphylococcus aureus. Consultation with the Infectious Disease Service was obtained, and the patient was started on massive doses of methicillin. After approximately a week of ventilatory support and intense antibiotic therapy, his blood gases gradually improved and the pulmonary infiltrates were clearing *(Figure 2)*. We were able to get him off the ventilator on his tenth day following operation.

Dr. Reckling: Dr. Hermreck, would you like to make some comments on the general treatment of lung injuries?

Dr. Hermreck: Usually, injuries to the lung can be treated conservatively or without operative intervention. This fact has been borne out in the Viet Nam and Korean experiences, where over 80 per cent of penetrating chest injuries were treated simply with tube thoracostomy and suction, and mechanical ventilatory support which may or may not require tracheostomy. About 90 per cent of thoracic injuries in civilian practice can also be treated by conservative means. The bulk of these injuries encountered are lacerations of the lung with pneumothorax or hemopneumothorax, fractured ribs with flail chest and paradoxical respiration, and rarely actual avulsion or laceration injuries of the tracheal-bronchial tree. The important point I want to stress is that the initial treatment of injuries to the bony

Figure 2. Chest x-ray one week following operation. The right lung field is clearing. The chest tubes have been removed. Note the numerous rib fractures on the right side.

thorax, lung parenchymal or tracheal-bronchial tree is the same, *i.e.,* chest tube drainage to reexpand the lung, and mechanical ventilatory support if respiration is not adequate. This must be done immediately to prevent tension pneumothorax and provide for adequate ventilation. Immediate or early thoracotomy is usually reserved for the patient with continued hemorrhage or a large air leak, such as seen in the patient today.

Delayed thoracotomy sometimes is necessary, however, to evacuate hematoma. As you know, during World War I and during the period prior to World War II, empyema was the dreaded complication of injury to the chest with a pneumo- or hemothorax. This was a time when antibiotics were not available, and pneumothorax as well as hemothorax was, paradoxically, not treated with tube thoracostomy because of the fear of introducing infection. A large number of these patients developed empyema anyway, and many others formed a fibrous hemothorax with secondary contracture of the lung. Many of these patients had to be operated upon and decorticated in order to reexpand the lung. Fortunately, that era is over and we now appreciate the necessity of early evacuation of blood from the pleural cavity in order to prevent the above complications.

Dr. Reckling: Are there any other comments?

Dr. Friesen: I would just like to point out that this is a very unusual injury. I can only recall one other similar injury in this hospital in recent years, and that was a patient of Dr. Leape's who sustained a total avulsion of a mainstem bronchus. Usually, bronchial avulsions or fractures are located at the fixed areas of the major bronchi. It is extremely unusual to have a peripheral bronchial laceration such as this.

Dr. Pokorny (Surgery Resident): Can we have some generalizations on how avulsion of laceration injuries of the tracheal-bronchial tree should be handled?

Dr. Thal: Peripheral segmental bronchial injuries are probably best treated by resection if air leaks and hemorrhage are a problem. More proximal bronchial or tracheal injuries can usually be treated by debridement and primary suturing.

Dr. Reckling: Thank you all for contributing to this conference.

Addendum

This patient was discharged from the hospital on the 34th postinjury day with further clearing of his right lung field *(Figure 3).* He did well for several weeks but was readmitted to this hospital approximately three months postinjury with fever and chills. The cause of his symptoms was never clearly established, but responded to broad-spectrum antibiotics, and, subsequently, he has done well.

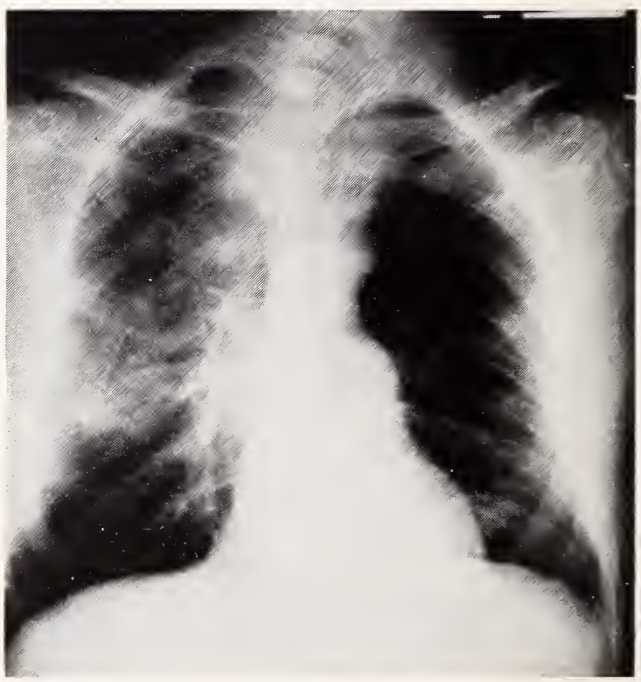

Figure 3. Chest x-ray prior to discharge. Further resolution of the right lung infiltrate has occurred. Again, note the extensive rib deformity on the right side.

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(Continued on page 454)

The President's Message

DEAR DOCTOR:

Your heart is still in the right place. You work your tail off for sick people, and find time somehow to do a thousand other things to make their hospitals, schools, and world better. Your patients know this about you. Do they know it is true for every doctor?

Do they know that sick people always get care if they desire it, even when there is no possibility of pay? Do they know that we subsidize welfare and the Blues with gratis work and fee reductions so that they can have these benefits? You bet they don't!

If they did, we would be invulnerable to the public criticism which appears daily in the news media.

Doctor, you need to tell them! Every one of us needs to be more vocal. We need to find better ways to get this across to the people.

Kenneth L. Graham MD

President

Editorial COMMENT

Journey Into Legend

As the medical education hot rod gains speed on the track, it appears that one of the crew may be a casualty from the exhaust fumes. That performer of menial medical tasks, the intern, always more than a little hypoxic, seems in danger of annihilation. This somber prospect came home to us recently when we inquired after a young friend whom we knew to be a senior medical student only a few weeks before and were informed he was now in his residency. Residency? What happened to the internship?

Historically, medical education has come almost full circle in the past century. From a time when young physicians were produced through the process of "reading" under an older physician (a euphemism for doing the cleaning up) or attending a series of lectures two years in a row, medical education reached a formalization by the 1900s in which courses of three or four years were the order of the day. This sufficed to get most aspirants past the licensing board (a new arrival on the scene in itself). Then someone came up with the idea that the youngster should go through a few practice sessions before being foisted off on the public, and the internship was born.

Briefly the intern enjoyed an exalted position, but medical information was propagating at hamster rate and it became popular to limit one's practice to some extent. Rapidly, specialization moved from trend to fact. At first, this was a matter of the physician getting up one morning and saying, "I believe I'll specialize in (insert name of desired speciality)," and the town had a new specialist. He might even go to the Big City and observe some Great Man cutting or poking for six weeks, giving him a status surpassed only by the rare fanatic who visited Vienna and was henceforth able to name-drop on a truly exhilarating level.

Medical courses now became firmly established at four years. The first was The Year of Fear, and the casualty rate was high. Next came the Year of the Tease, when Hygeia dropped her strap just enough to keep the sophomore panting after her. Then the Year of Enlightenment, when medical practice showed some promise of becoming a reality and some students even learned something. Then came the Year of Grace. The school had so much invested in the seniors that graduation was practically assured. Besides, the senior had already been endowed with the title of "Doctor" by the clinic patients and some of the hometown folks who recalled he hadn't been around for quite a spell but couldn't rightly remember whether he had ever finished or not.

But then came the internship, the Year of the Gripe. This anticipated year of practical initiation, which would provide our medical Galahad with shield and sword, turned out to be a year in which he became a specialist in urinalysis and blood counts. On rounds, the Great Man bestowed his benign wisdom on the students and consulted with the resident who was, of course, one of his own. Meanwhile, the intern was chasing down the missing x-ray report, being chastised for an incomplete record, or doing yesterday's UA's so there would be room by the sink when they brought in today's. He was not denied access to the patient—he caught up with the group in time to roll the bed down after the Great Man had finished his brilliant dissertation. He was permitted to get up in the night and unplug the catheter on the patient the resident had operated that day. He was permitted to explain under the stern gaze of the Great Man and the baleful look of the resident (who feared the indirect loss of some points) why the patient, scheduled for surgery, was permitted to have breakfast—as though the intern had fed it to him bite by bite.

He was permitted to go ask the resident on another service why the bleep their consultant hadn't seen the Great Man's patient. And rearrange the bleeping answer in terms that could be safely transmitted to the Great Man. He was permitted to receive the brunt of the Nursing Supervisor's displeasure which, of course, could not be visited upon the resident or G. M. And then, when a moment of peace arrived, he could go and do the urines and blood counts, secure in the knowledge that he could always serve mankind as long as it could urinate or bleed.

He had only one haven and release. In the privacy of the interns' quarters, and secure among his peers, he could gripe—and did with consistence and vehe-

mence. Room, board, and laundry—and the right to gripe. He would not learn until later that this capability to rail against the injustices of his lot would be the most important lesson he would learn and the one he would use most in the years to come. For the time, he simply reveled in sounding forth on any suitable subject: the resident, the food, the Great Man, the Nursing Supervisor, the resident, the UA's, the old biddy in 357, the resident. Not even in his military service, the only other area in contention, would he be inspired to the superb development of his art as in these happy moments.

The beginning of the end for the intern came not when a High Council of Great Men decided it was necessary to abbreviate medical training. It began when someone found you could dip a plastic strip into the patient's urine and learn everything you wanted to know about him. This was too simple, quick, and clean to be entrusted to an intern. He began to fade when the hospital discovered that an automated central laboratory was a good source of revenue. Then, when it was decided to compress the curriculum, his fate was sealed. It was only fitting that the intern be sacrificed—he always felt that he was expendable anyway. And in his hour of departing, he will probably be, like the man who is pleased to get his name in the paper even if it is his obituary, grateful for finally receiving some recognition, even if it is his termination.

But there is a lingering thought. If he isn't necessary now, why was he before? If he learned anything in his internship, when is he going to learn it in the New Order? How does one go to bed one night as a student and get up the next morning a resident? Obviously, the whole thing calls for a good gripe session—and we'll have no one around to do the griping.—*D.E.G.*

The Fall Meeting

of the

HOUSE OF DELEGATES

Sunday, November 19, 1972–10:00 A.M.

Skyline Room, Lawrence, Kansas

One day business meeting to consider items relating to legislation and others that cannot be delayed until May. It is hoped all component societies will be represented by their full complement of delegates.

All members of the Society are invited.

Obituaries

HENRY F. H. HAERLE, M.D.

Dr. Henry F. H. Haerle, 79, died July 13, 1972 in Marysville. He was born February 3, 1893 in Kansas City, Missouri.

Dr. Haerle was graduated from the Southwest School of Medicine and Hospital of Kansas City in 1916. He had practiced medicine for 45 years.

Survivors include his wife, a son, and a daughter.

ROBERT G. KLEIN, M.D.

Dr. Robert G. Klein, 80, died August 25, 1972 in Wichita. He was born October 13, 1891 in McKeesport, Pa.

Dr. Klein was graduated from the University of Illinois School of Medicine in 1915. He had practiced medicine in Kansas since 1916.

Surviving Dr. Klein are a daughter and a son.

WILLIAM G. RINEHART, M.D.

Dr. William G. Rinehart, 72, died August 10, 1972 in Pittsburg. He was born December 13, 1899 in Ogden, Iowa.

Dr. Rinehart was graduated from the University of Illinois School of Medicine in 1925. He had practiced medicine in Kansas since 1933.

Surviving Dr. Rinehart are his wife, a daughter, and two sons.

JOSEPH SHAFFER, M.D.

Dr. Joseph Shaffer, 86, died August 23, 1972 in Simpson. He was born December 1, 1885 in Washington.

Dr. Shaffer was graduated from the Nebraska College of Medicine in 1907. He practiced medicine in Kansas beginning in 1908 until his retirement in 1968.

Survivors include a daughter and a son.

JESSE L. WENTWORTH, M.D.

Dr. Jesse L. Wentworth, 88, died August 25, 1972 in Arkansas City. He was born December 3, 1884 in Ashton.

Dr. Wentworth was graduated from the Chicago College of Medicine and Surgery in 1911.

A daughter and two sons survive.

The Kansas Secondary Rheumatic Fever Program

Past, Present and Future

W. A. STANLEY,* DONALD E. WILCOX, M.D.† *and* ANTONI M. DIEHL, M.D.‡

THE PURPOSE of this article is to acquaint the physicians and allied health delivery personnel of Kansas with important changes which are occurring in the Secondary Rheumatic Fever Prophylaxis Program in this state. It is our firm belief that these changes will not only further reduce the incidence of rheumatic fever recurrences, but will also simplify the mechanics of the program and lower the cost of its operation to the patients.

Since January 1962, 627 patients have been placed on the Kansas Heart Association registry and program for low-cost secondary rheumatic fever prevention. Through the sponsorship of the Kansas Heart Association, Kansas State Department of Health, Kansas Medical Society, and the Kansas Pharmaceutical Association, the secondary rheumatic fever program was developed as a pilot project to operate for several years in order to establish the efficacy and feasibility of such a program. The Sedgwick County chapter of the Kansas Heart Association had previously developed a similar program for their geographic area and plans to continue same in the future.

Because the Kansas Heart Association pilot program had been in operation for ten years as of January 1972, the Rheumatic Fever and Congenital Heart Disease Committee suggested that certain applicable aspects of this established program be considered for transfer to another health agency in Kansas. The American Heart Association recommends that such pilot programs should be incorporated into the regular pattern of professional and agency health deliverance care systems after they have demonstrated their worthiness and feasibility. Since the program had been demonstrated to be effective in enhancing registration of rheumatic fever subjects—thereby enabling them to receive low-cost streptococcal prophylaxis with a built-in reminder system to assist in continuous compliance to prevent rheumatic fever recurrences—a more determined program ensued.

A proposed understanding between the Kansas Heart Association and the Kansas State Department of Health was developed as to which responsibilities each health agency would assume.

Comparison of Previous With Future Programs

In both of the programs, the Kansas Heart Association provides the application forms and informational materials to physicians and patients. The physicians make applications to the Kansas Heart Association for their patients. Upon approval, the patients are placed on the registry. Previously, the Kansas Heart Association maintained the registry. After October 1, 1972, the registry will be kept by the Epidemiologist of the State Department of Health. Formerly, the Kansas Heart Association provided the physician with prescription pads for his patient when oral prophylaxis was prescribed. The physician completed and signed the prescription in duplicate giving it to the patient. The latter took both copies of the prescription to the cooperating pharmacy, and, upon payment for the low-cost drug, received the medication. The pharmacist placed one copy of the prescription in his file and forwarded the duplicate to the Kansas Heart Association, where it was used as a reorder of the drugs for replacement and also served as a reminder that the patient had obtained his prophylaxis. When injectable benzathine penicillin G was requested, the prescription was prepared in duplicate, the physician kept one copy in his office and the duplicate was forwarded to the Kansas Heart Association office for replacement of the disposable syringes; again the prescription copy was placed in the patient's file as a reminder that the rheumatic individual was receiving his prophylaxis. The lack of these duplicates in a patient's file enabled initiation of established followup

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‡ Chairman, Rheumatic Fever and Congenital Heart Disease Committee, Kansas Heart Association, Inc.; Professor of Pediatrics, Department of Pediatrics, University of Kansas School of Medicine, Kansas City, Kansas 66103.

procedures to remind patients and their physicians of the noncompliance of the streptococcal prophylaxis.

Under the new system, the physician will submit the duplicate prescriptions for oral medications to the Epidemiologist. The latter will keep one copy for the patient's file, send the medication prescribed along with the duplicate to the physician for delivery to the patient. There will be no cost to the physician or patient. No medication will be mailed directly to the patient.

When injectable benzathine penicillin G is prescribed, the physician will submit the duplicate prescriptions for his patients to the Epidemiologist. Again one copy of the prescription will be maintained in the patient's file, and the other will be mailed with the syringes directly to the physician for administration. When requested by the private physician and agreeable with the local health department, the disposable benzathine penicillin G syringes will be mailed with duplicate prescription to the local health department for administration by nurses or physicians.

The Kansas State Department of Health will perform the followup necessary to assure compliance with the physicians' recommendations as to streptococcal prophylactic medication. This will be accomplished through cooperation of the local health departments and the Public Health Nurses when absence of the duplicate copies of the prescriptions in a patient's file indicates he had not returned to his physician for prescription renewal. *Table I* compares graphically the old and new programs.

The Kansas Heart Association has developed a program to arrange and pay for rheumatic fever and rheumatic heart disease evaluation of patients under 21 years of age. This facet of the Rheumatic Fever Program is available only to those patients whose physicians submit the application for admission to the rheumatic fever registry and free streptococcal prophylaxis, and then only after obtaining written consent of both the private physician and the patient, or his parents or legal guardian. Patients will not be obligated to undergo such evaluations in order to be placed or to remain on the prophylaxis program. However, this is a valuable service to the patient and his physician to be more certain that there is true need for the individual to be on the registry and maintained on streptococcal prophylactic medication. These evaluations can be arranged for and accomplished prior to, or at any time after, approval is granted for placement on the program.

TABLE I

COMPARISONS OF PROTOCOL, OLD AND NEW KANSAS HEART ASSOCIATION SECONDARY RHEUMATIC FEVER PREVENTION PROGRAM

Task	*Old Responsibility*	*New Responsibility*
1. Supply applications to physicians	KHA	KHA
2. Accept and review application	KHA	KHA
3. Arrange for evaluation of patients	KHA	KHA
4. Approve or disapprove applications	KHA	KHA
5. Provide educational materials to physicians and patients	KHA	KHA
6. Refer applicants to KSDH	KHA	KHA
7. Maintain the Rheumatic Fever Registry	KHA	KSDH
8. Send appropriate prescription blanks to patient's private physician	KHA	KSDH
9. Provide patient with prescription	KHA (low cost)	KSDH (free)
10. Assume responsibility for renewal of prescription at appropriate intervals	KHA	KSDH
11. Discontinue prophylaxis at the request of physician	KHA	KSDH
12. Keep individual records up to date on patients	KHA	KSDH
13. Supervise follow-up for compliance	KHA	KSDH
14. Maintain continuity of the streptoccal prophylaxis through record-keeping system	KHA	KSDH
15. Provide expertise and control through committee	KHA	KHA-KSDH

Legend: KHA—Kansas Heart Association; KSDH—Kansas State Department of Health.

Conclusion

It is anticipated that the above modifications in the Kansas Secondary Rheumatic Fever Program will be beneficial from several points of view. Those patients who do not have rheumatic fever will have less of a chance of being labeled with this diagnosis, thereby avoiding the inconvenience to the patient and his physician for prophylaxis, reduce the long term costs and the psychological trauma associated with the stigmata of this disease. Those individuals with rheumatic heart disease or other forms of cardiovascular disorders will be more readily identified

(Continued on page 454)

Medical-Legal Page

Paraplegic Denied Recovery For Hospital Injuries

A paraplegic patient who suffered refracture of his leg, allegedly due to a nurse's negligence in turning him in his hospital bed, was denied recovery of damages by a California jury. Suit had been brought against the hospital and the nurse.

The patient, a 26-year-old maker of orthopedic braces, was confined to a wheelchair because of a childhood injury. His legs were osteoporotic from disuse. At the time of the present injury, he was hospitalized because of a fractured femur, which was repaired by open reduction and plating.

In his action for malpractice against the hospital and nurse, the patient claimed that the nurse had grabbed his ankle in turning him over in bed, thus refracturing the femur. The femur was reset with rods, which the patient claimed should have been used in the first operation.

The hospital contended the nurse had not touched the patient. She allegedly told him to wait for her to help him turn. As she was going around to the other side of the bed, he raised his trunk, grabbed the trapeze, and began to turn himself. There was a loud pop, as some of the screws pulled out of the plate and the bone was refractured.

The head nurse testified that the manner in which the nurse said she intended to turn the patient was in accordance with the standard of care used in turning a paraplegic. A physician, after reviewing the records, testified that good standard procedure had been followed in the hospital at all times.

As a result of the refracture, the patient's leg was shortened one and one-half inches. Although formerly he could stand in long leg braces, after the injury he was confined to a wheelchair.—*Pauly v. Stanford Medical Center* (Cal.Super.Ct., Santa Clara Co., Docket No 221014, Sept. 24, 1971)

Public Hospital Possibly Liable For Denial of Sterilization

A public hospital might be liable for damages for denying a woman's request for sterilization, according to a federal appellate court. The hospital based its decision on a hospital rule permitting sterilization only to women with five or more children. The applicant had four children.

In the summer of 1970, a 25-year-old woman who had been pregnant six times and had four living children agreed with her husband that she should undergo a voluntary sterilization. Due to a thyroid condition, the woman could not take birth control pills. The couple felt that they could not rely on other, riskier means of contraception and decided upon sterilization.

The couple visited the county public hospital to seek the operation but were told by a physician in the department of obstetrics and gynecology that the regulations of the hospital forbade the operation unless the applicant already had five children. Thus, the couple were denied approval for the operation.

Because of inability to pay, the couple were unable to go to a private hospital and seek a physician willing to perform the operation.

Thereafter, the woman filed suit in the federal court, claiming that the public hospital had violated her constitutional rights by refusing to sterilize her. The woman claimed that the wrongful refusal was done under color of state law and was, therefore, contrary to a federal statute.

After the suit was filed, the public hospital agreed to, and did sterilize the woman. The hospital then asked the trial court to dismiss the suit, since the operation had been performed. Over the objections of the woman, the suit was dismissed.

In reversing the order of dismissal and ordering a trial, the court stated that the complaint sufficiently alleges that the hospital and the physicians involved used authority which they possessed by virtue of state law. The court held that the essence of the claim was that the refusal to sterilize was based, not on medical factors peculiar to her case, but on an arbitrary formula. The decision was therefore not one of medical judgment.

The claim was not frivolous, the court said, and warranted a full hearing in a trial. The court noted that the woman's claim for damages did not become moot merely because the operation was eventually performed. The complaint properly alleged damages by showing that during the period when the hospital refused to perform the operation, the woman was in constant fear of becoming pregnant.—*McCabe v. Nassau County Medical Center*, 453 F.2d 698 (C.A.2, Dec. 23, 1971)

Reprinted from *The Citation*, published by the Office of the General Counsel, American Medical Association.

This month's articles are reprinted from Vol. 25, No. 5, June 15, 1972.

CRITERIA FOR THE DIAGNOSIS OF ALCOHOLISM

Medical Criteria for the Diagnosis of Alcoholism, which are the first ever to be formulated, were published jointly by the *American Journal of Psychiatry* and the *Annals of Internal Medicine.* A pioneering effort that many authorities in the alcoholism field traditionally considered to be an impossible task, was done by a committee established by the National Council on Alcoholism. After its initial preparation, the Criteria was submitted to other experts for criticism and documentation.

The Criteria were formulated to meet the urgent need for guidelines in proper diagnosis and evaluation of this disease by the medical profession and socio-legal disciplines. Although alcoholism, which affected millions of Americans, has finally become widely accepted as a major health problem in this country, many of the aspects of its myriad ramifications still remain controversial issues. Among these, one of the fundamental aspects is that concerning the establishment of the diagnosis of alcoholism.

For the purpose of diagnosis, the Criteria appear under headings of Major and Minor, and are assembled according to type—"Physical and Laboratory" (including major alcohol-associated illnesses), and "Behavioral, Psychological and Attitudinal." Because early diagnosis is helpful in treatment and recovery, manifestations are separated into "Early" and "Late." Each symptom is finally graded by group number representing degree of implication and presence of alcoholism. Also included are brief discussions of recurrent and arrested alcoholism, cross dependency, tolerance, and a list of categories of persons with a "high risk" for alcoholism.

The Criteria are guidelines designed not only to put the diagnosis of alcoholism on a standardized basis, but also to avoid over-diagnosis, *i.e.,* to guard an individual from the presumption of alcoholism unless clearcut reproducible data are available to confirm the diagnosis.

Physiological and psychological manifestations are considered separately, and are divided into major and minor criteria. Symptoms which are conclusive evidence of either physiological or psychological dependence are considered major criteria, while minor criteria include symptoms which are usually associated with but are not necessarily indicative of alcoholism.

Examples of major criteria are the presence of the withdrawal syndrome, tolerance to the effects of alcohol, the presence of alcoholic blackout periods, and continued drinking despite strong medical or social contraindication. Examples of minor criteria are such physiological disorders as cardiac arrhythmias and such behavior patterns as gulping drinks, taking drinks surreptitiously, and automobile accidents.

The satisfaction of one or more major criteria is sufficient for the diagnosis. In its absence, several minor criteria of varying types are needed. However, a purely mechanical selection of items is not enough: the history, physical examination and other observations, plus laboratory evidence, must fit into a consistent whole to ensure a proper diagnosis. Other diagnoses short of alcoholism may be indicated even where the symptoms are alcohol-related.

The Criteria Committee is an ongoing function of the National Council on Alcoholism and it is expected that experience ratings for these criteria will be obtained as a guide for future modifications.

Rheumatic Fever Program

(Continued from page 452)

so that their program of medical or surgical management can be planned. Free prophylaxis will be available to those individuals who have bonafide rheumatic fever, thereby making it easier for them to comply with streptococcal prophylaxis.

Lastly, with better followup of those individuals who are noncompliant in regard to taking continuous streptococcal prophylaxis, the incidence of recurrences of rheumatic fever should be further reduced, thus lessening the likelihood of progressive rheumatic heart disease.

It is the responsibility of Kansas citizens, as well as the providers of health care, to reduce the morbidity and mortality rates from cardiovascular diseases—the Number One killer. The changes being made in the Kansas Secondary Rheumatic Fever Program are being implemented to accomplish this goal by identifying the patient at risk with rheumatic fever and protecting him against recurrences of this disease and its potentially ominous sequela of rheumatic heart disease.

KUMC Trauma Conference

(Continued from page 446)

3. Jones, R. J.; Samson, P. C. and Dugan, D. J.: Current management of civilian thoracic trauma. *Amer. J. Surg.* 114:298, 1967.

4. Naclerio, E. A.: *Chest Injuries. Physiologic Principles and Emergency Management.* New York, Grune & Stratton, 1971.

5. Samson, P. C. and Burford, T. H.: Total pulmonary decortication. *J. Thor. Surg.* 16:127, 1947.

Personalities--IN KANSAS MEDICINE

H. F. Janzen, Hillsboro, announced his retirement after 34 years of medical practice there.

Wilmer A. Harms, Halstead, has joined the Hertzler Clinic as an ophthalmologist.

Among those participating as speakers at the programs on arthritis were **David H. Clark**, Wakeeney; **Elmer W. Taylor**, Sedan; **Robert M. Dickerson**, Garden City, and **Jack A. Grove**, Newton.

Addressing the Stormont-Vail graduating class of nurses, **William R. Lentz**, Topeka, stressed the importance of personal care.

G. Gayle Stephens, Wichita, appointed as the first faculty member at the Wichita State University Branch of the KUMC, will be the chairman of the Department of Family Practice.

Receiving the Volunteer of the Year award from the American Cancer Society was **Alfred M. Tocker**, Wichita.

R. L. Marshall, Dodge City, has conducted a public seminar on symptoms, causes, and remedial possibilities of gynecological disorders.

The Kansas Tuberculosis and Health Association new President is **E. C. Altenbernd**, Overland Park.

F. Calvin Bigler, Garden City, was elected to the board of directors.

C. A. Nystrom, Topeka, was the featured speaker at the Inter-Faith Fellowship public meeting in Beloit.

Concerned with the problems of citizen participation, **Carl Tompkins**, Newton, is serving as chairman of the Health Planning Council for South Central Kansas.

The Northeast Kansas Chapter of the March of Dimes is planning a genetics counseling center in Topeka to provide information and assistance to physicians and individuals with genetically related problems. **William H. Crouch** and **David E. Gray**, Topeka, were featured speakers at a March of Dimes awards banquet. Both are members of the chapter's Medical Advisory Board.

CORRECTION

Through misinformation, F. H. Relihan, M.D., Smith Center, is listed in the current Kansas Medical Society directory as being retired.

We are happy to correct this erroneous report and congratulate Dr. Relihan on his continued service.

Woman's Auxiliary

. . . Annie takes a trip to the stars

"The time has come," the walrus said, "to talk of many things." And the time also came for your Auxiliary Annies to talk of many things. Unlike the walrus, however, the state officers, past presidents, state committee chairmen, and county presidents didn't gather to talk of "shoes and ships and sealing wax," but to talk of AMA-ERF, legislation and the new LEGS program, International Health, and scores of other things.

Wednesday, September 13, found lots of lovely ladies tripping down the steps of the Hutchinson Community Junior College Library to attend the regular fall board of directors' meeting. The setting was inspirational. The new John F. Kennedy Library stands between the equally new Arts and Science Building and the not-so-new, but just as beautiful architecturally, Lockman Hall. Farther down campus, the ultra-modern Student Union waited for inspection at lunch time.

It took all morning to attend to the business at hand. Chairmen made their reports, briefing the group on new ideas and trends. News was reported about past presidents who couldn't attend, and officers told of their plans for the year.

We had a few important guests, too. Dr. Kenneth Graham came to call, as did Dr. John Blank, the chairman of the Auxiliary Advisory Committee, and Mr. James Agin, Oliver Ebel's new assistant. Annie thinks Mr. Agin probably learned a lot of things about women that day! Mr. George Cooper, academic dean of the college, also came in to welcome the women. It was quite an important affair.

The day on campus had things to offer other than routine business. The new Health Careers Bus made its debut all spiffy in pretty lemon yellow paint with orange, green, and turquoise trim. Big black letters identify it as HER for "Health Education Resources" and the property of the Woman's Auxiliary to the Kansas Medical Society. The State Board of Health might argue that last point, but we'll call the bus ours until they no longer lend it to us, anyhow. Inside the displays from the three state universities, the Kansas Academy of Family Practice, the Kansas Dental Association, the Medical Technicians, Medical Assistants, Physiotherapists, Nurses, the Halstead Health Museum, and the State Board of Health depicted the attractions of their careers and information in health areas. The bus attracted plenty of attention from JUCO students, as well as the Auxiliary members who went "back to school" for the day.

When "class" was dismissed at noon, the Auxiliary students all tripped over to the Student Union for lunch in the student cafeteria. Reno County Auxiliary women "helped out" by serving coffee after the guests went through the line. They were also responsible for the table decorations and favors. Styrofoam red wagons on the tables depicted the "It's Your Red Wagon" theme chosen by the president for the 1972-73 year. Karolyn Hinshaw, editor of the Auxiliary News, made those and the menu programs. The Reno County Auxiliary members made the little plaques that were given to each guest. Mrs. Jerry Spitzer spearheaded this hardworking group. From the sounds of the work session reports everyone had a ball making those things.

The day wasn't over yet. Following lunch, the board members were guests of their president for a special show at the school's Planetarium. Titled "Stars, Gods and Music," this program wound up a busy day with a relaxing hour watching the simulated Heavens while listening to a musical commentary. The Planetarium's new "surround sound" stereo installation merges with stars and primitive images of gods and men in this special presentation of music and light. One of the few private planetariums in the United States, this facility compares with those in large cities. A small space museum in the lobby is an added attraction for the celestial minded.

Annie felt well-informed when the day was over and happy about the whole thing. The state board members departed with "stars in their eyes," thinking about the happy prospect of a prosperous Auxiliary year.

One last thought . . . the bus might be Her('s), but we are always . . . Yours.

Auxiliary Annie

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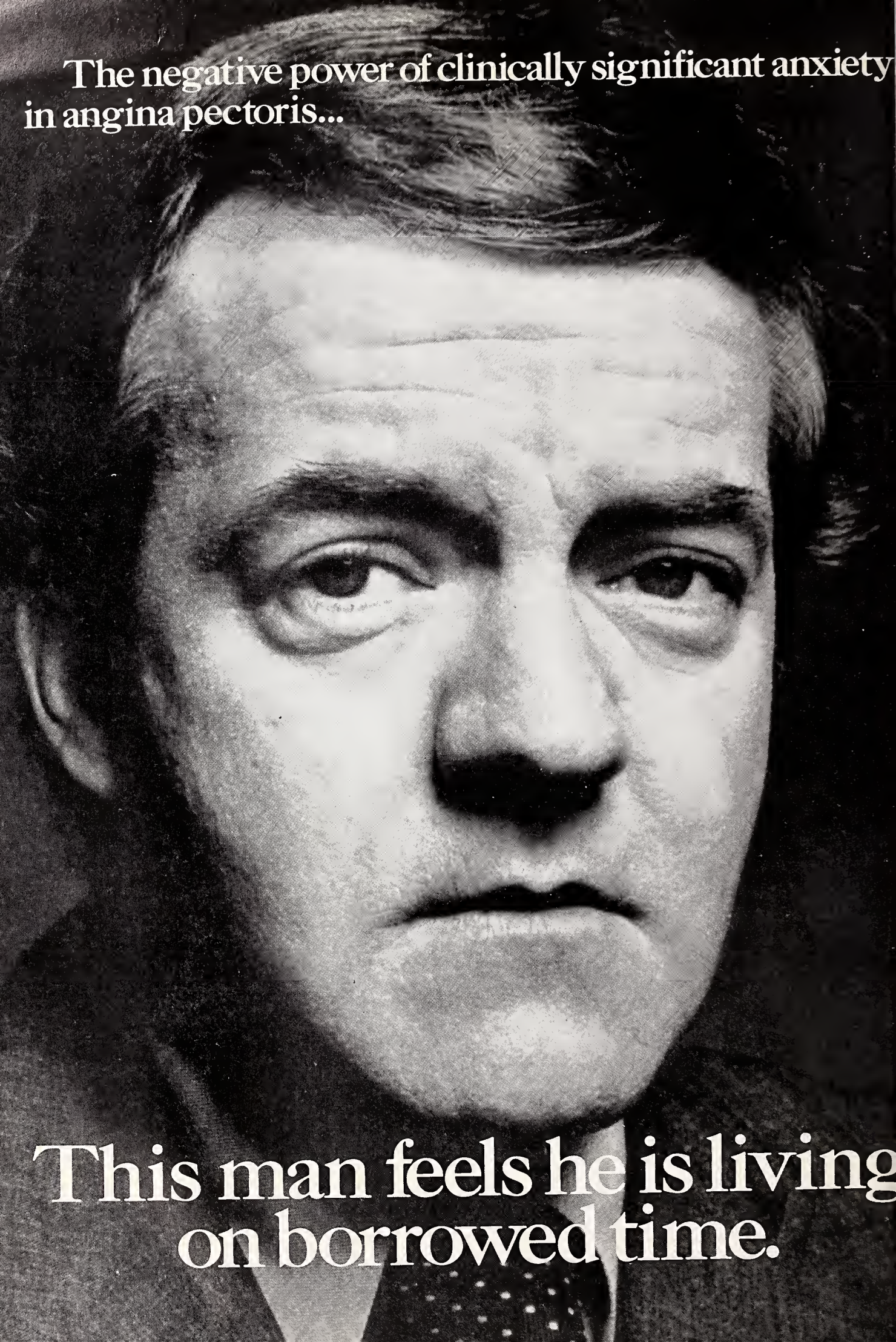
The negative power of clinically significant anxiety in angina pectoris...
This man feels he is living on borrowed time.

During anginal attacks, patients may suffer intense apprehension. More frequently, however, they experience a continuing sense of less severe but nonetheless disproportionate anxiety.

Reduction of such clinically significant anxiety is important, since undue emotional stress may precipitate further anginal episodes.

Adjunctive Librium (chlordiazepoxide HCl) may be especially suitable for relief of clinically significant anxiety and emotional tension in anginal patients because of its generally prompt therapeutic effectiveness and wide margin of safety. In a recent double-blind randomized study,* Librium (chlordiazepoxide HCl) was administered for relief of moderate anxiety in 20 anginal patients seen in office practice over a 20-week period. Symptoms of emotional distress related to anxiety were rated at base-line, one week, two weeks and monthly thereafter. Relief was obtained notably early in therapy. The clinical results demonstrated that Librium offers the coronary patient an antianxiety drug that, in the author's opinion, is both effective and safe. In general use, the most common side effects reported have been drowsiness, ataxia and confusion, particularly in the elderly and debilitated. (See summary of prescribing information.)

Librium (chlordiazepoxide HCl) is used concomitantly with certain specific medications of other classes of drugs, such as cardiac glycosides, diuretics and antihypertensive agents, whenever anxiety is clinically significant. The drug should be discontinued after anxiety has been reduced to appropriate levels.

The positive power of adjunctive Librium® (chlordiazepoxide HCl)

10-mg, 25-mg capsules up to 100 mg daily

for moderate to severe anxiety accompanying angina pectoris

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Relief of anxiety and tension occurring alone or accompanying various disease states.

Contraindications: Patients with known hypersensitivity to the drug.

Warnings: Caution patients about possible combined effects with alcohol and other CNS depressants. As with all CNS-acting drugs, caution patients against hazardous occupations requiring complete mental alertness (*e.g.*, operating machinery, driving). Though physical and psychological dependence have rarely been reported on recommended doses, use caution in administering to addiction-prone individuals or those who might increase dosage; withdrawal symptoms (including convulsions), following discontinuation of the drug and similar to those seen with barbiturates, have been reported. Use of any drug in pregnancy, lactation, or in women of childbearing age requires that its potential benefits be weighed against its possible hazards.

Precautions: In the elderly and debilitated, and in children over six, limit to smallest effective dosage (initially 10 mg or less per day) to preclude ataxia or oversedation, increasing gradually as needed and tolerated. Not recommended in children under six. Though generally not recommended, if combination therapy with other psychotropics seems indicated, carefully consider individual pharmacologic effects, particularly in use of potentiating drugs such as MAO inhibitors and phenothiazines. Observe usual precautions in presence of impaired renal or hepatic function. Paradoxical reactions (*e.g.*, excitement, stimulation and acute rage) have been reported in psychiatric patients and hyperactive aggressive children. Employ usual precautions in treatment of anxiety states with evidence of impending depression; suicidal tendencies may be present and protective measures necessary. Variable effects on blood coagulation have been reported very rarely in patients receiving the drug and oral anticoagulants; causal relationship has not been established.clinically.

Adverse Reactions: Drowsiness, ataxia and confusion may occur, especially in the elderly and debilitated. These are reversible in most instances by proper dosage adjustment, but are also occasionally observed at the lower dosage ranges. In a few instances syncope has been reported. Also encountered are isolated instances of skin eruptions, edema, minor menstrual irregularities, nausea and constipation, extrapyramidal symptoms, increased and decreased libido—all infrequent and generally controlled with dosage reduction; changes in EEG patterns (low-voltage fast activity) may appear during and after treatment; blood dyscrasias (including agranulocytosis), jaundice and hepatic dysfunction have been reported occasionally, making periodic blood counts and liver function tests advisable during protracted therapy.

Supplied: Librium® Capsules containing 5 mg, 10 mg or 25 mg chlordiazepoxide HCl. Libritabs® Tablets containing 5 mg, 10 mg or 25 mg chlordiazepoxide.

*Levine, S.: "Angina Pectoris and Emotional Overlay," Scientific Exhibit presented at the Annual Meeting of the Maine Medical Association, Kennebunkport, Me., June 13-15, 1971.

A copy of the Levine study may be obtained from your Roche representative.

ROCHE

Roche Laboratories
Division of Hoffmann-La Roche Inc.
Nutley, N.J. 07110

Volume LXXIII, Number 11—November, 1972

The JOURNAL of the KANSAS MEDICAL SOCIETY

Contents for November

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Address all correspondence to the JOURNAL OF THE KANSAS MEDICAL SOCIETY, 1300 Topeka Avenue, Topeka, Kansas 66612. Manuscripts should be submitted to the Managing Editor. Refer to "Information for Authors" for details.

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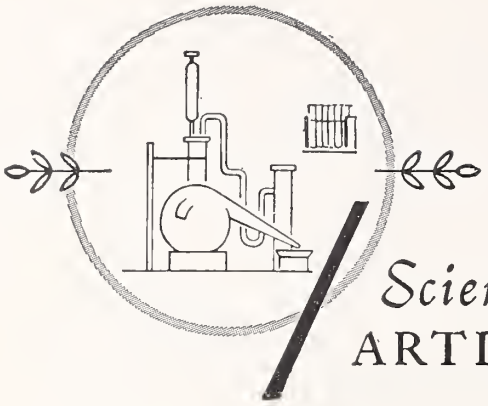
American College of Physicians Issue

The November issue of the JOURNAL is devoted entirely to the papers presented at the Regional Meeting of the American College of Physicians on February 25, 1972, in Topeka.

The program chairman for the meeting was Dr. Walter Menninger of Topeka and he has made possible the collection and presentation of these papers. For this the Editorial Board is deeply grateful.

This is the sixth such issue in the last few years. The JOURNAL appreciates this opportunity to expand the audience for these interesting and instructive papers which originated in Kansas.



Scientific
ARTICLES

Continuous ECG Monitoring

To Evaluate Unexplained Dizziness, Syncope and Chest Pain

JAMES C. MERSHON, M.D. *and* ROGER J. CUNNINGHAM, M.D., *Wichita*

The Holter technique is a valuable clinical tool in evaluation of patients who have unexplained symptoms suggesting transient cerebral ischemia as the etiology and in patients with unexplained chest pain, who either have a negative standard exercise test or their symptoms can be provoked only by physical or emotional stimuli that cannot be duplicated in the office, or in whom standard ECG stress testing is contraindicated.

THE STANDARD electrocardiogram is fundamental in the recognition of cardiac arrhythmias and diagnosing cardiac ischemia. However, the conventional electrocardiogram recorded in the office or hospital samples only a fraction of the patient's waking hours and is of no value in evaluation of symptoms that occur only during sleep. The standard electrocardiogram and even the stress electrocardiogram do not allow evaluation under conditions of normal activity, where patients are exposed to physical and emotional stimuli. The physician may not consider a cardiac arrhythmia in his evaluation of obscure neurologic symptoms or atypical chest pain. Over 50 per cent of patients with cardiac arrhythmias are not aware of any arrhythmia and present themselves to the physician with symptoms of dizziness, weakness, chest pain, or dyspnea. Recognition of a transient arrhythmia as the underlying cause of the patient's symptoms permits more appropriate and satisfactory treatment than do symptomatic measures such as vasodilators.

Method

The small portable cardiorecorder developed by Holter[1] that continuously monitors the electrocardiogram, has made it possible to monitor patients for up to 12 hours under conditions of ordinary activity. These recorders are commercially available through Avionics Research Products Corporation.

The Holter system consists of two electronic devices: a portable tape recorder, and a playback mechanism.[2]

The tape recorder, which records an electrocardiographic signal, is a small battery-operated unit weighing only four pounds, and designed to be carried by the patient in a camera-like leather case on a shoulder strap or waistband. We are presently employing three electrodes, one under each clavicle and one over the rib inferior to the cardiac apex. This results in a bipolar lead that resembles lead V5 of the standard electrocardiogram.

The playback instrument for ECG analysis allows for the simultaneous monitoring on separate oscilloscopes of the heart rate and individually displayed

Presented at the annual meeting of the Kansas Chapter, American College of Physicians, Topeka, Kansas, February 25, 1972.

Address reprint orders to: James C. Mershon, M.D., 3244 E. Douglas, Wichita, Kansas 67208.

ECG complexes. The oscilloscope on the left side displays superimposed P, Q, R, S, T complexes, and any change in the configuration of the P, the QRS complex, the T wave, or the ST segment can be easily detected. Any change in the heart rate or rhythm is depicted by the playback on the right oscilloscope and also by a change in pitch of an audible signal. A clock, mounted on the front of the unit, can be used to determine the time that an electrocardiographic abnormality appeared. By setting the clock to the time the monitoring was started, electrocardiographic events can be correlated temporally with the patient's diary of activity and symptoms. The playback time is exactly 60 times the recording time, so that a ten-hour tape can be reviewed in only ten minutes. If, during this rapid scanning, an abnormality is noted, the read-out can be changed to real time by pushing a button, and the electrocardiogram can be printed out on standard ECG paper for further analysis and reporting.

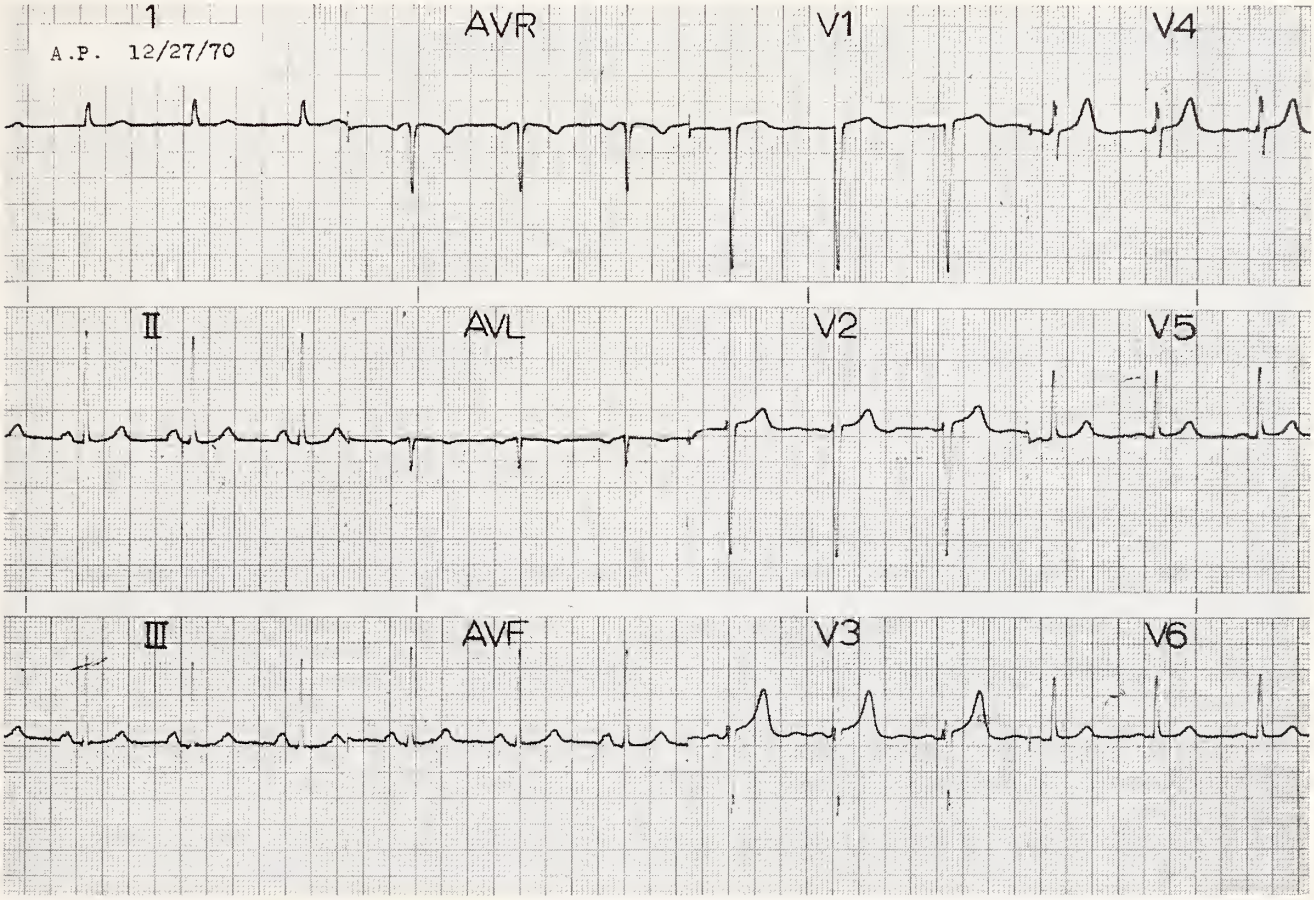


Figure 1. Conventional electrocardiogram within normal limits except for poor R forces in V1-V3.

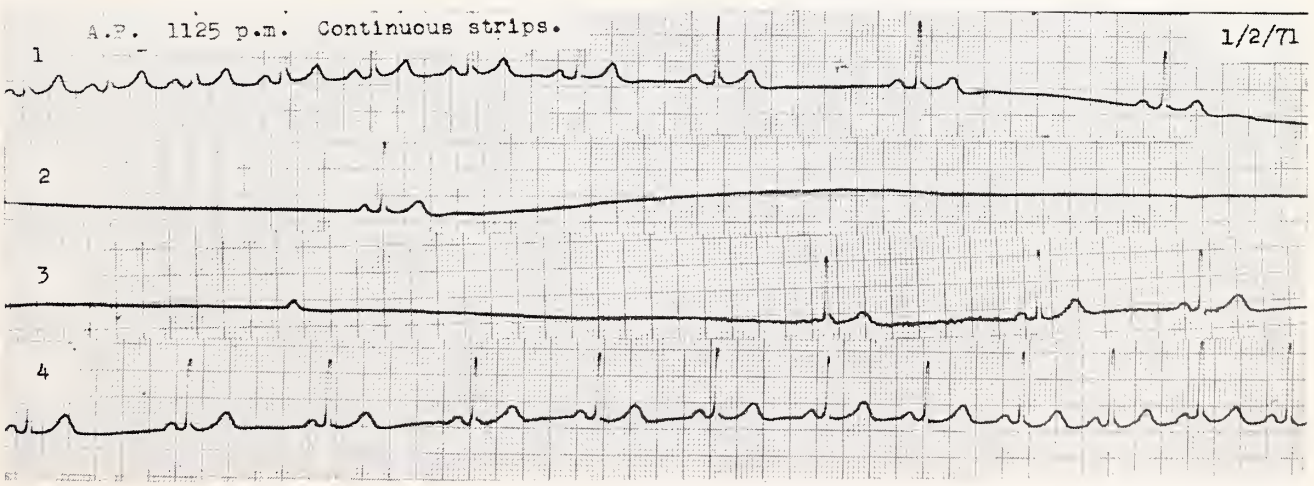


Figure 2. Continuous ECG revealed the onset of marked sinus bradycardia followed by a prolonged period of cardiac standstill.

The patient is allowed to wear the recorder while at home or at his place of employment, and is instructed to perform the tasks or engage in activity that provoke his symptoms. He is instructed to record the time of his symptoms and information regarding possible precipitating factors, such as physical or emotional stress.

Case One

A 78-year-old man was admitted to the hospital because of a fractured jaw sustained when he suddenly lost consciousness and fell. A loud carotid bruit was present. The results of a complete neurologic workup, including brain scan and cerebral blood flow studies, were normal. The conventional electrocardiogram was within normal limits *(Figure 1)*. His electrocardiogram was continuously monitored using the Holter technique. At 11:25 PM, while asleep, the electrocardiogram showed the onset of a marked sinus bradycardia followed by a prolonged period of electrical arrest *(Figure 2)*. It was assumed that a similar episode had been responsible for his syncope and, therefore, a permanent transvenous demand pacemaker was inserted. He has had no further episodes of syncope. The continuous ECG discovered a bradyarrhythmia that was not suspected and made it possible to institute appropriate therapy.

Case Two

A 74-year-old retired farmer had a history of six syncopal episodes and numerous episodes of lightheadedness in the previous year. These episodes were often, but not always, associated with exertion, and frequently occurred after a meal. Physical examination revealed bilateral carotid bruit. His conventional electrocardiogram showed only nonspecific ST-T changes at the rate of 55 per minute. Continuous ECG monitoring showed a period of ventricular bigeminy that correlated with an episode of lightheadedness which occurred approximately 20 minutes after his lunch *(Figure 3)*. ST segment changes which occurred while walking were also noted. In retrospect, he related that he had had tightness in his throat with exertion for some time, but had not considered it to be an important symptom. Following the insertion of a permanent transvenous pacemaker, he has had no recurrence of lightheadedness or syncope, and has had a reduced frequency of tightness in his throat.

Even short periods of frequent premature beats may precipitate lightheadedness or syncope. This is

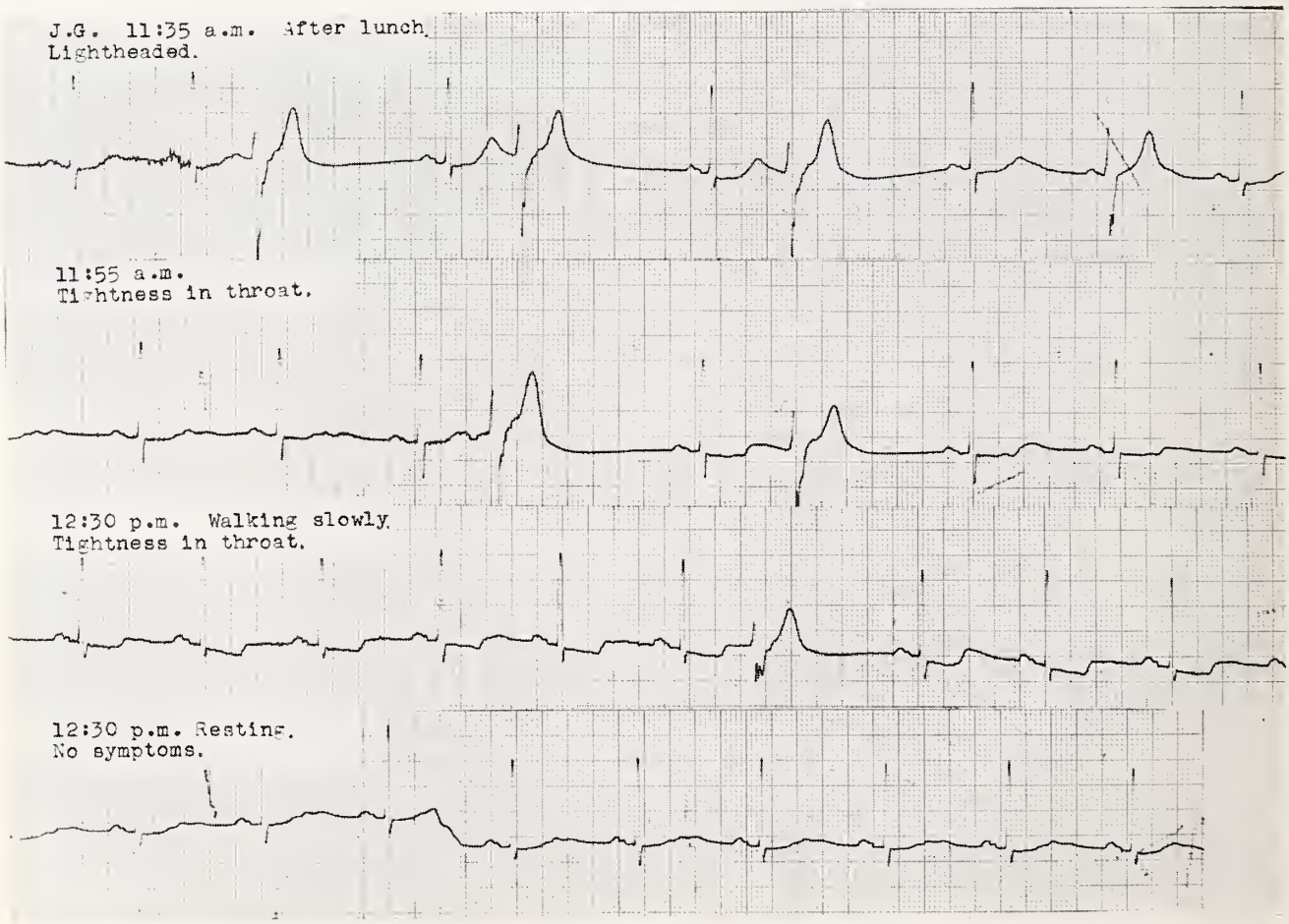


Figure 3. Ventricular bigeminy was noted during the episode of lightheadedness. In the third strip, recorded while walking in the hall and experiencing tightness in the throat, more marked ST segment changes were seen.

more likely to occur in the elderly, where arteriosclerotic changes in the cerebral vessels may have already reduced cerebral blood flow, and the further reduction in cardiac output brought about by even a minor arrhythmia may decrease the cerebral blood supply below a critical level.

Case Three

A 63-year-old woman had a documented myocardial infarction ten years previously, and subsequently had typical angina pectoris which was promptly relieved with nitroglycerin treatment. She recently had noted angina with less strenuous exertion, not always relieved by nitroglycerin, and also had had episodes of dizziness and syncope related to exertion. A standard electrocardiogram was normal; an exercise stress test was positive, but the patient did not experience any symptoms during the exercise. The patient was monitored using the continuous electrocardiogram. *Figure 4* shows the ECG pattern at the time when the patient was walking from her bed to the bathroom. It revealed an unsuspected atrial ventricular block, Mobitz type II second degree A-V block. She noted lightheadedness at this time but did not experience chest pain. Although she did not develop syncope while undergoing diagnostic evaluation, the known high incidence of complete heart block associated with Mobitz type II block led us to believe that her syncopal episodes were due to complete heart block. A permanent transvenous pacemaker was inserted, after which her only symptom was angina, when overexerting.

This case has two important messages. One, is that patients may have an exacerbation of angina by transient conduction defects or arrhythmias; and the second, is that patients with symptoms of diffuse cerebral ischemia might have an underlying transient conduction defect or arrhythmia.

Case Four

A 58-year-old man had angina pectoris for six years. One year ago, he had several presyncopal episodes and his family physician, noting an irregularity of his heart rhythm, had started him on diphenylhydantoin (Dilantin) 100 mg four times a day. Although this controlled his presyncopal episodes, the severity of his angina had increased. The conventional electrocardiogram showed only occasional pre-

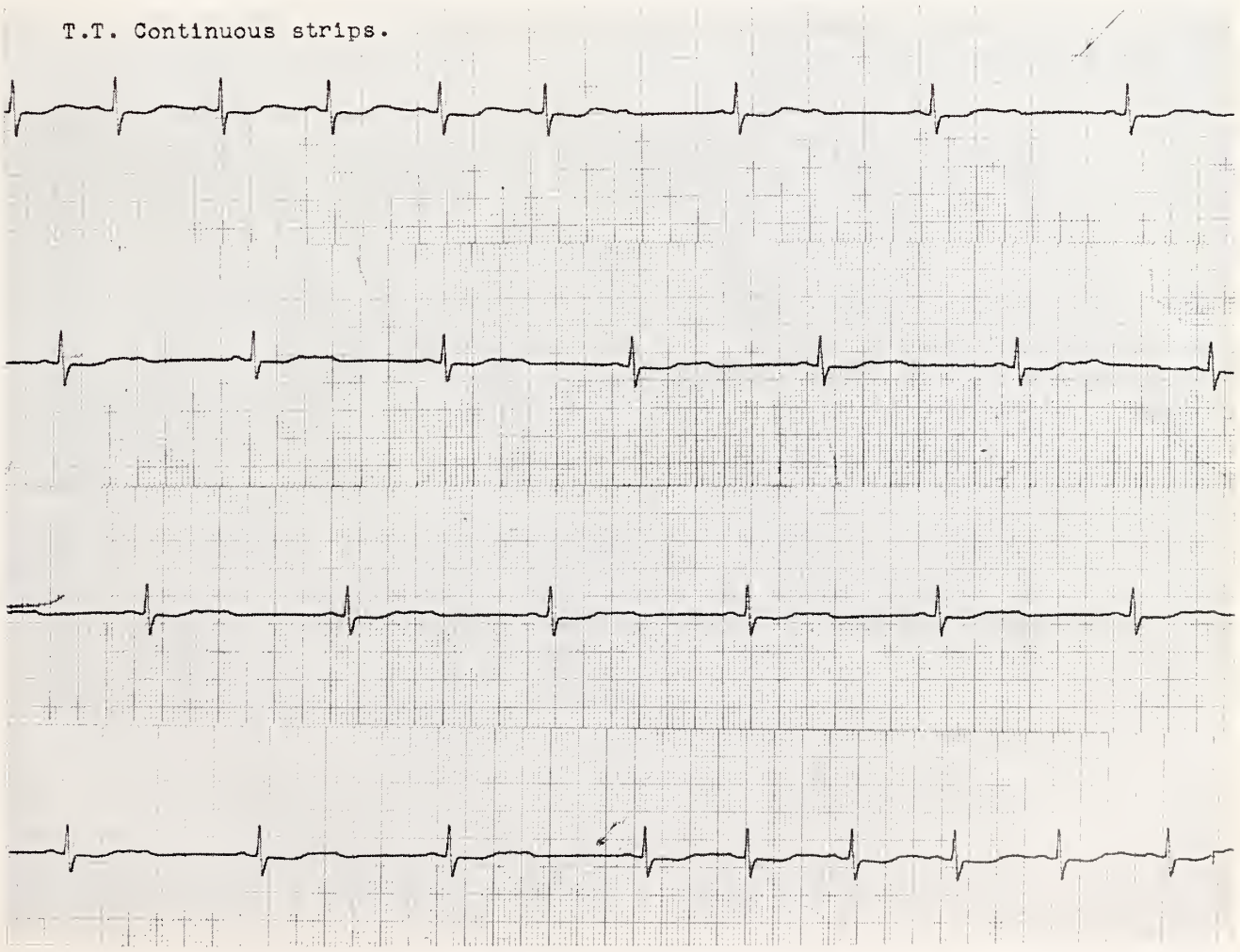


Figure 4. Continuous strip coinciding with episode of lightheadedness during exertion. The ECG strips show the appearance of Mobitz type II A-V block.

mature ventricular contractions. It was suspected that an arrhythmia was responsible for the increased severity of his angina, and a continuous ECG was obtained. During mild exercise, the patient experienced mild substernal chest pain. At this time, the electrocardiogram showed ST segment depression and a burst of atrial tachycardia *(Figure 5)*. A minute later, while the patient continued to experience chest pain, an even greater ST segment abnormality was noted.

Digitalization was recommended to prevent the supraventricular arrhythmia which was thought to be aggravating this patient's angina.

Case Five

An 80-year-old man had experienced numerous dizzy spells. His electrocardiogram *(Figure 6)* revealed first degree AV block, left axis deviation, and right bundle branch block, so-called incomplete bilateral bundle branch block or trifascicular block. Because of the known associated high incidence of complete heart block with trifascicular block, the patient was initially treated with sublingual isoproterenol HCl (Isuprel) but without benefit. This medication was discontinued and a continuous electrocardiogram was obtained. During an episode of dizziness, the electrocardiogram showed a single premature atrial beat followed by an episode of paroxysmal atrial tachycardia which lasted one minute *(Figure 7)*. *Figure 8* shows an episode that lasted 23 minutes. The patient was treated with digitalis. He had no further episodes of dizziness.

In this case, the standard electrocardiogram led to the misdiagnosis of complete heart block and to inappropriate therapy. The continuous electrocardiogram revealed a tachyarrhythmia, which probably resulted in a reduction of cardiac output and decreased cerebral blood flow.

Case Six

A 66-year-old woman's angina and atrial flutter had been well controlled with digoxin and nitroglycerin. Recently, she had noted as many as 20 episodes a day of lightheadedness and sometimes impending syncope, both usually associated with exertion. She also had had more frequent episodes of angina. The standard electrocardiogram on admission to the hospital showed left bundle branch block and atrial flutter with varying degrees of A-V block. It was assumed that the symptoms were due to the patient's known tachyarrhythmia, and additional amounts of digoxin were given without benefit. A continuous ECG was obtained *(Figure 9)* which revealed a supraventricular tachycardia followed by

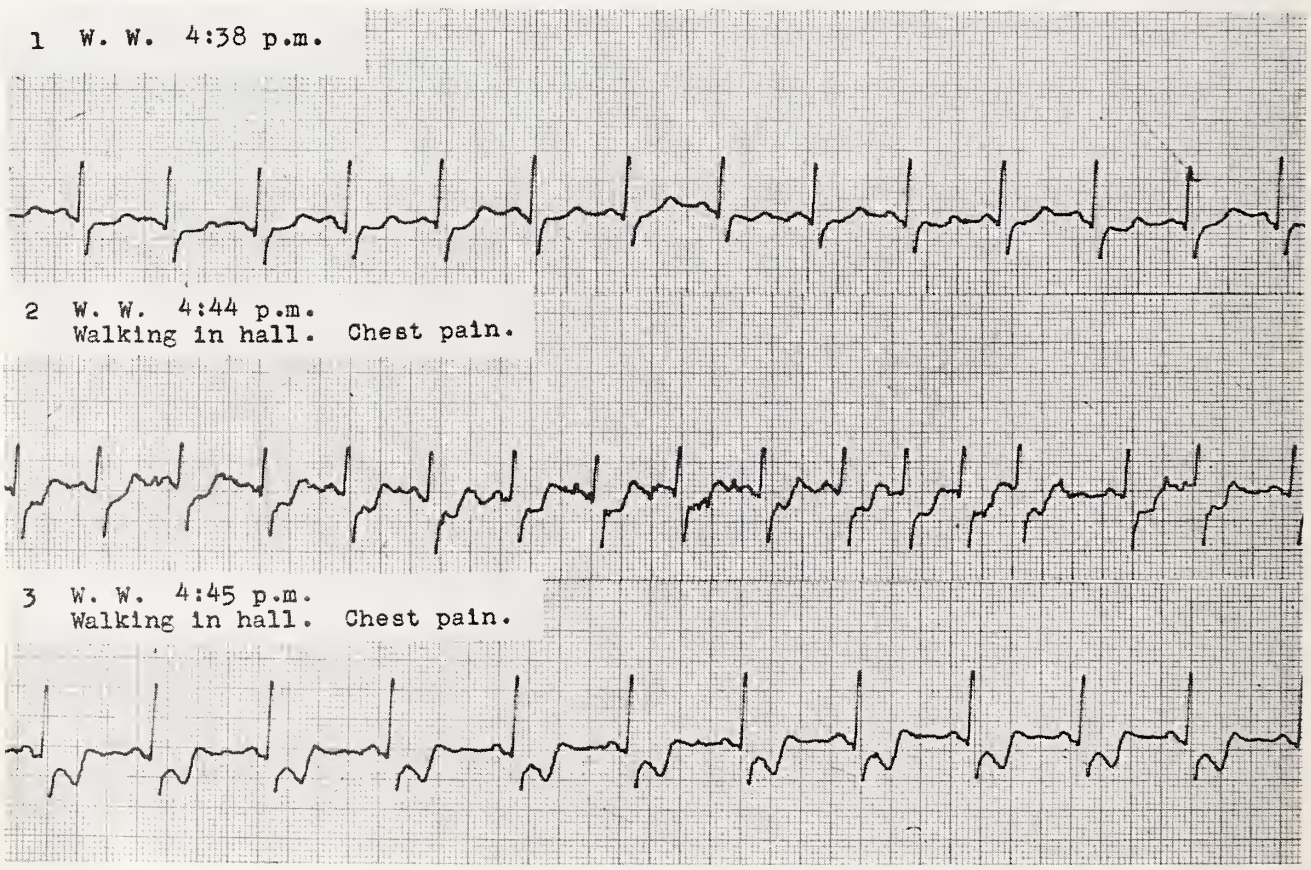


Figure 5. The first strip taken with patient at rest; second strip, while walking and experiencing chest pain, shows ST segment depression which could be explained by a change in position, and a short burst of atrial tachycardia. The bottom strip, taken a minute later, shows marked ST segment changes highly suspicious of ischemia.

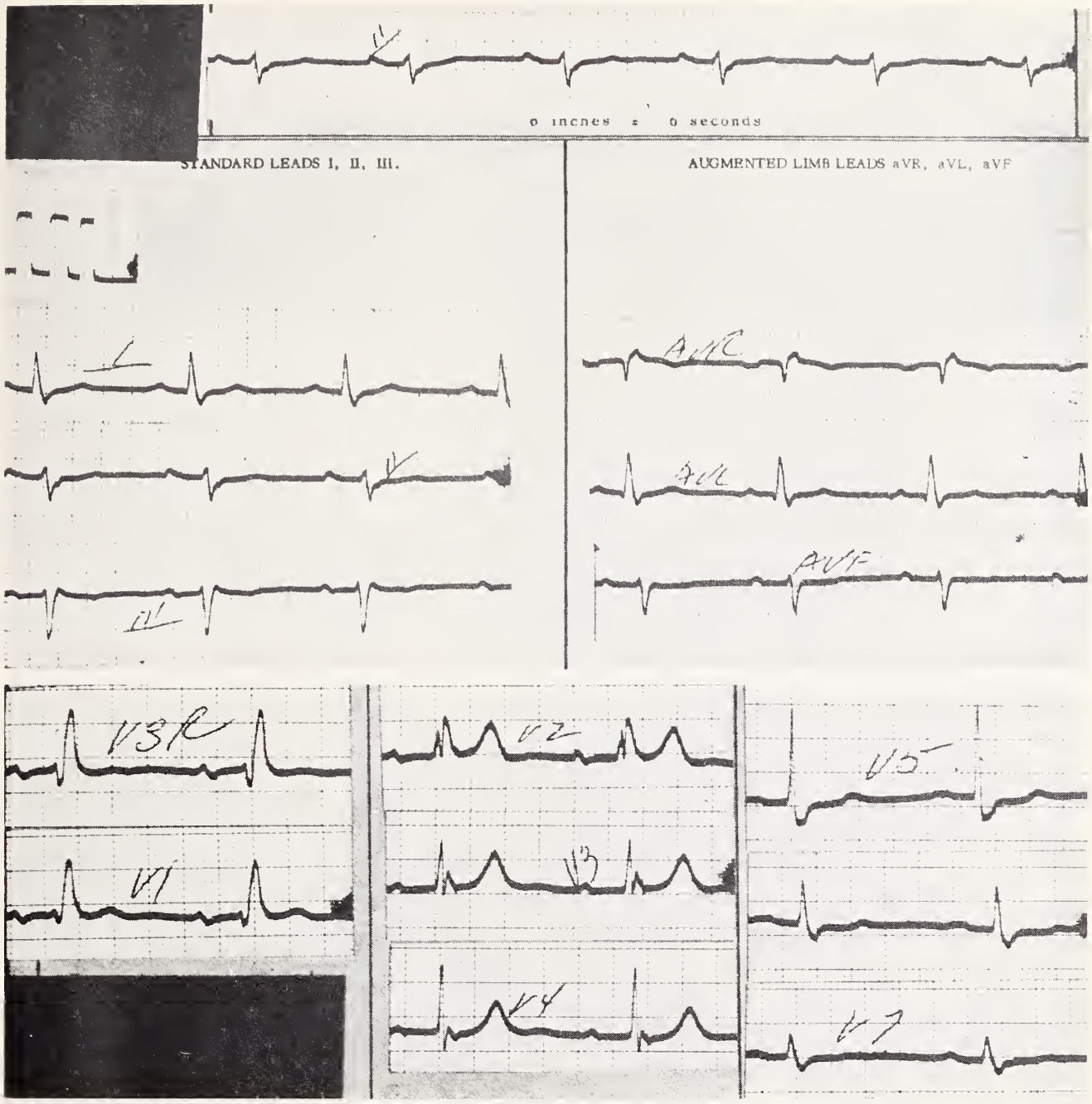


Figure 6. The standard electrocardiogram shows first degree A-V block, left axis deviation and right bundle branch block, the so-called incomplete bilateral bundle branch block or trifascicular block.

a long period of atrial arrest, followed by multiple atrial ectopic beats and multiple periods of atrial arrest. This was followed by a period of normal sinus rhythm. The patient was transferred to the coronary care unit and digoxin was withheld. After several days of monitoring, she continued to show periods of sinus arrest interspersed with episodes of supraventricular tachycardia. During the periods of tachycardia, she frequently experienced angina. This was felt to be an example of the so-called "sick sinus node syndrome," and a permanent transvenous demand pacemaker was recommended. Following insertion of the pacemaker, she continued to have episodes of supraventricular tachycardia, but they were readily and safely controlled with the combination of digoxin and propranolol. She subsequently was free of lightheaded episodes and had only infrequent angina.

This case illustrates that a hidden arrhythmia, rather than a pre-existent known arrhythmia, may be responsible for symptoms. The continuous ECG provided precise documentation of tachyarrhythmias and atrial arrest periods, and appropriate therapy was instituted.

There are many other situations in which continuous ECG monitoring might be of value.[3, 4] There is a large group of patients in whom standard stress ECG testing might be contraindicated because their

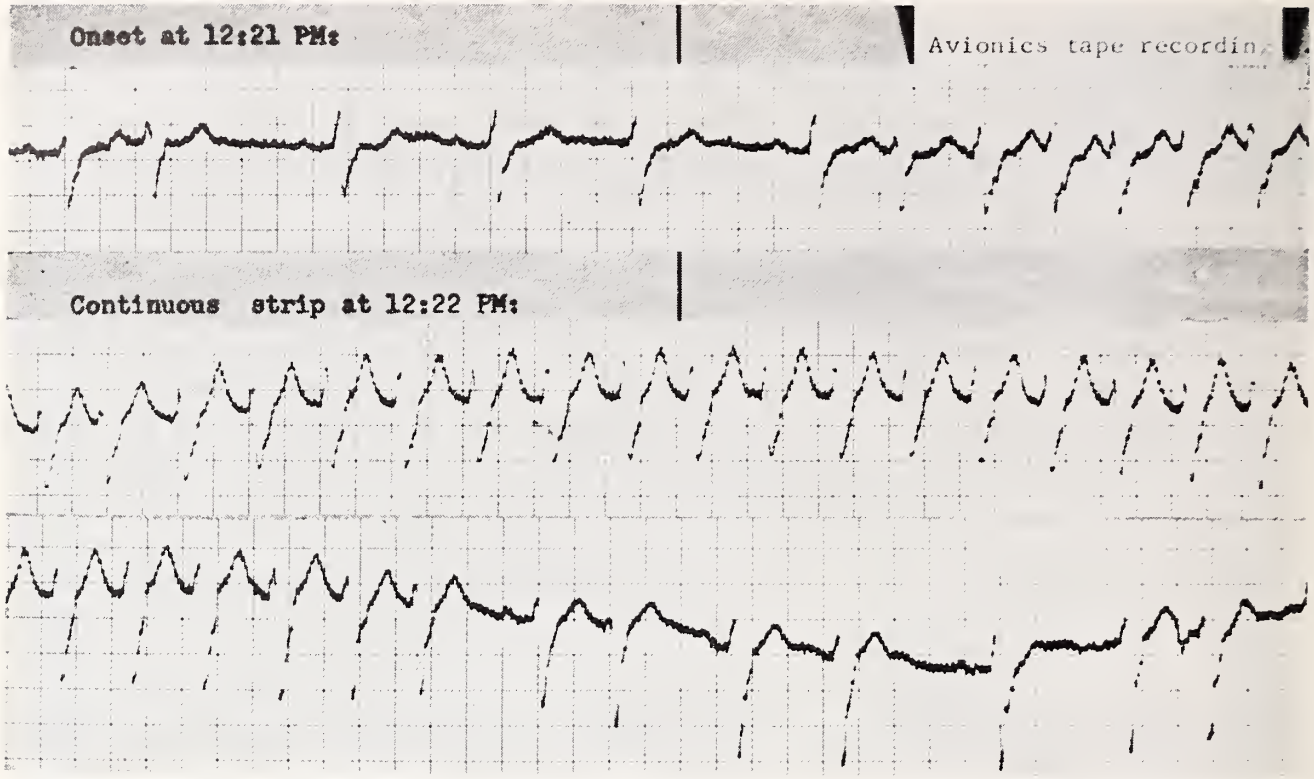


Figure 7. During a period of lightheadedness, the continuous ECG reveals a single premature atrial beat followed by an episode of paroxysmal atrial tachycardia which lasted one minute.

heart disease may be considered too severe, or because of physical impairments, such as arthritis, paralysis, amputations, and other problems. A second group consists of patients with known myocardial infarction, followed by atypical chest pain, who also have an additional disease, such as emphysema, costochondritis, or hiatus hernia, which make it difficult to be certain that the atypical pain is not the result of cardiac ischemia. A final group consists of patients with angina that occurs under specific conditions, such as during emotional trauma, while driving, or at high altitude. Included in this group are patients with angina at rest, for example Prinzmetal's angina, postprandial angina, and nocturnal angina. Although 90 per cent of patients with angina have a constant pattern, occasionally patients will have two types of chest discomfort and both will be angina, as shown by ST changes on the Holter continuous ECG monitor.

Summary

Continuous ECG monitoring, using the Holter technique, is a valuable clinical tool in evaluation of patients who have unexplained symptoms suggesting transient cerebral ischemia as the etiology. It is also useful in the evaluation of patients with unexplained chest pain who either have a negative standard exercise test or their symptoms can be provoked only by physical or emotional stimuli that cannot be duplicated in the office, or in whom standard ECG stress testing is contraindicated. With proper selection, by eliminating recognizable neurologic, metabolic, musculoskeletal, or other problems, a high yield of positive results can be expected.

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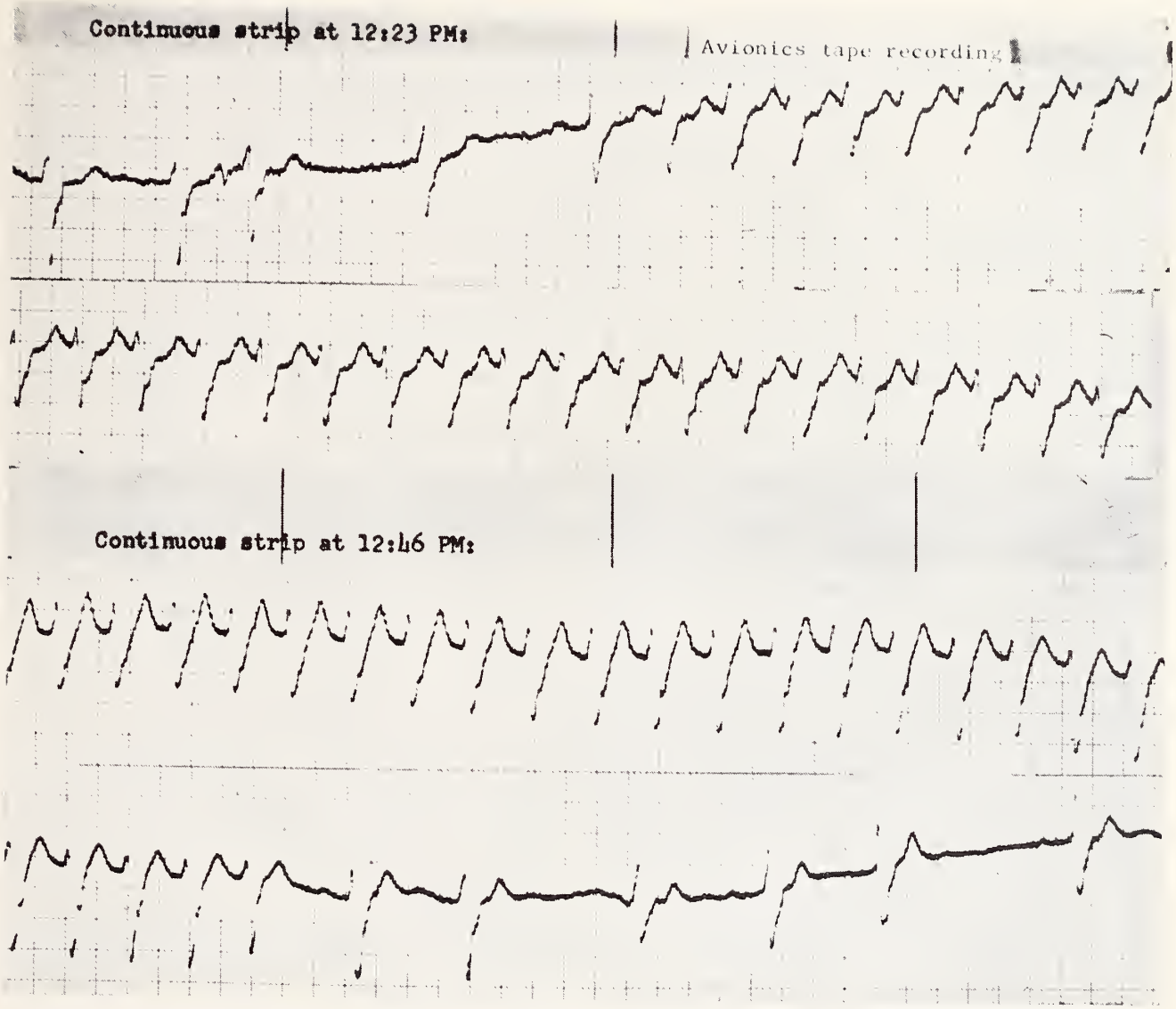

Figure 8. The continuous ECG reveals an episode of paroxysmal atrial tachycardia that lasted 23 minutes.

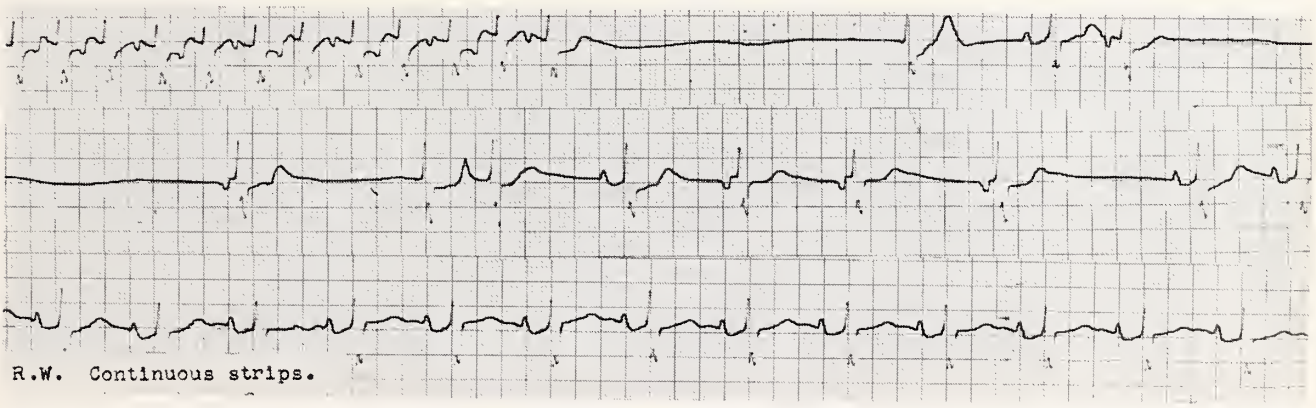

Figure 9. The continuous ECG in the top strip shows a supraventricular tachycardia followed by a long period of atrial arrest, followed by multiple atrial ectopic beats and multiple periods of sinus arrest. The bottom strip shows a normal sinus rhythm.

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Nonocclusive Hemorrhagic Bowel Necrosis

Review of Literature and Report of Two Cases

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MANY TYPES of ischemic bowel syndromes have been described. Broadly, they can be divided into two groups: occlusive and nonocclusive. Nonocclusive hemorrhagic bowel necrosis is a hemodynamic abnormality of the mesenteric circulation. Many terms have been used to describe this condition, *e.g.*, "nonocclusive mesenteric ischemia," "intestinal infarction without mesenteric occlusion," and "terminal hemorrhagic necrotizing enteropathy." But the most descriptive term seems to be, "nonocclusive hemorrhagic bowel necrosis."[1-4] There is no agreement as to who described this condition first, but in the American medical literature, Thorek is credited with the first description of this clinicopathological entity.[5] Since then, about 500 cases have been described in the English language medical journals.[1]

Anatomy, Physiology and Pharmacology of Mesenteric Circulation

The superior mesenteric artery supplies blood from the second part of the duodenum to the splenic flexure of the colon, through its various branches which form tiers of arcades in the mesentery to the small bowel; the branches to the colon form marginal artery of Drummond at the mesenteric border of ascending and transverse colon.[6,7] The inferior mesenteric artery supplies blood to the terminal part of transverse colon, the descending colon, sigmoid and upper part of the rectum. The splenic flexure represents an area of relatively poor blood supply lying between the areas of distribution of superior mesenteric and inferior mesenteric arteries. The total mesenteric flow at an arterial pressure of 130 mm Hg is 600 ml/m/m,[2] or 20 per cent of cardiac output. The intestine gets approximately 60 per cent of the total mesenteric flow.[8] In the mesenteric circulation there are no-end arteries, but there is an extensive submucous plexus of vessels derived from the arterial chains. From this network arise the mucosal arteries which also freely anastomose on the muscular as well as the glandular aspect of muscularis mucosae. Meta-arterioles arise from the arterioles and, in turn, give rise to precapillaries, which form true capillaries that join with the venules. Simple arteriovenous anastomoses also occur between an arteriole and a venule. Arterioles and meta-arterioles have smooth muscle in their walls and exhibit vasomotor tone, whereas the precapillaries and the true capillaries are noncontractile.[9] There are baroreceptors in the mesenteric vessels, and these are involved in the local regulation of flow.

According to the Law of LaPlace, when the intravascular pressure drops below the tension exerted by the arteriolar wall, the vessel collapses. So there exists a "critical closure" pressure of 15 mm Hg in the dog, below which the flow ceases.[10,11] In cases of aortic incompetence, when the diastolic pressure falls below the "critical closure" pressure, the mesenteric flow is impaired; nonocclusive hemorrhagic bowel necrosis occurs with greater frequency in cases of aortic incompetence. Sympathetic stimulation, vasopressin, angiotensin, adrenalin, noradrenalin, and metaraminol are constrictors of mesenteric vessels; sympathectomy, acetylcholine and histamine are dilators of mesenteric vessels.

Factors Involved in Pathogenesis

Congestive Heart Failure, Digitalization, and Cardiac Arrhythmias

Congestive heart failure causes anoxia of the capillaries thereby weakening their walls and causing escape of fluid and red blood cells into the tissues.[12] However, in aortic incompetence without clinically evident congestive heart failure, hemorrhagic bowel necrosis occurs if aortic pressure falls below the critical closure pressure (vide supra) and vessel closure occurs causing anoxia and necrosis of the intestine.[13]

The adverse effect of digoxin on splanchnic circulation has been seen both under clinical and experimental conditions. In a study when intravenous digoxin was given to patients in ventricular failure, most of them showed an increase in cardiac output (11 to 90%), and decrease in systemic resistance, while at the same time the splanchnic blood flow fell (12 to 39%). There was a rise in splanchnic re-

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sistance.[14] In a series of 11 patients who were on high dosage of digitalis acute hemorrhage and bowel necrosis were described. Four of the patients did not experience congestive heart failure,[15] indicating that digitalization independent of congestive failure can cause mesenteric ischemia.

The deleterious effect of supraventricular cardiac arrhythmias on splanchnic circulation has been documented in both humans and experimental animals. In one study,[16] mesenteric blood flow decreased 28 per cent, and mesenteric vascular resistance increased during paroxysmal atrial tachycardia; atrial fibrillation reduced the mesenteric flow by 34 per cent. On conversion to normal sinus rhythm, mesenteric blood flow returned to control levels. Atrial and ventricular premature beats decreased the mesenteric blood flow very little. In the pathogenesis of clinically observed cases of nonocclusive ischemic bowel necrosis there seems to be an interplay of congestive heart failure, digitalis toxicity, and cardiac arrhythmia, but the relative contribution of each separately is difficult to assess. Although a majority of the patients have congestive heart failure, cases of bowel necrosis have been described in its absence.

Shock and Hypotension

Shock and hypotension can cause hemorrhagic necrosis of the intestine without vascular occlusion.[17] However, in humans intestinal necrosis is an infrequent lesion in shock.[3] Although shock is present in a majority of these cases, it seems to be preceded by abdominal symptoms and is a terminal event.[18, 19] It would appear that shock is the result rather than the cause of this condition. Cases have been reported where shock was absent.[19] However, when shock is treated with vasopressors, the incidence of bowel infarction is high. In this regard it is interesting to note that patients with pheochromocytoma have a high incidence of bowel infarction.[20] Hemorrhagic necrosis of the bowel, due to loss of blood and fluids, causes hypovolemia, sepsis, the possible intestinal absorption of a myocardial depressant factor, decreased cardiac output, and sympathetic stimulation. The two latter factors cause splanchnic vasoconstriction, thus setting up a vicious cycle.[21]

Infection

Nonocclusive hemorrhagic intestinal necrosis resembles the histopathological appearance of the condition reported as pseudomembranous enterocolitis in the older literature.[22] So infection has been considered a factor in some cases. In one series, five of the six reported cases had gram-positive bacilli (C perfringens) in the intestinal submucosa.[23] In one series, 20 per cent of the patients with hemorrhagic necrosis had fatal infection, and 50 per cent of these grew either gram-negative bacilli or coagulase positive staphylococci on post mortem blood culture. Fever and leukocytosis have been reported in many cases.[19] The toxins of these organisms are known to have a vasoconstrictive effect on mesenteric vessels and have been shown to produce hemorrhage and necrosis of the intestine.[17, 24, 25] It is probable that the bacterial invasion of the gut wall is secondary to anoxic damage brought on by congestive heart failure.

Clinical Features

The exact incidence of this entity is now known. In one series of 1,535 autopsies over a period of seven years, 75 cases (4.8%) were found with hemorrhagic necrosis.[19] Other reported series indicate an incidence of 0.8 per cent and 1.6 per cent.[3, 4] In one series, the average age was 67 years, most of the cases occurring in the 60-69 year age group.[3] No sex preference was reported in one series, whereas in another series males predominated over females 2:1.[3, 19]

Abdominal Signs and Symptoms

Abdominal pain. Abdominal pain had been reported in 30 per cent of cases.[3, 19] In most, it is of less than one day's duration but can be as long as one week. It is usually mild and located in the epigastric region, but can occur in the right upper quadrant and lead to a mistaken diagnosis of acute cholecystitis.[3, 19] Abdominal pain has been reported in cases of nonocclusive intestinal necrosis in patients with aortic insufficiency without congestive heart failure.[13]

Abdominal distention and vomiting have been noted in 20 to 25 per cent of cases.[3, 19]

Melena and diarrhea have been recorded in 15 to 30 per cent of the cases with this entity.[3, 19]

Abdominal tenderness is known to occur in 50 per cent of the cases but usually there is no guarding, unless there is bowel perforation.[2] Diminished bowel sounds are infrequent.

Shock

Shock has been reported in 80 per cent of the cases.[3, 19] In the majority, abdominal symptoms precede hypotension; in a few cases, hypotension and abdominal symptoms occur together, and rarely hypotension precedes abdominal symptoms.[3]

Fever and Leukocytosis

These occur in many cases of intestinal necrosis.[2, 3, 19] They may be due to secondary bacterial infection.

Albuminuria and Hypoglycemia

In one series, albuminuria was noted in 90 per cent of the cases, but 75 per cent of them suffered from congestive heart failure,[2] so albuminuria was probably secondary to the congestive heart failure.

Hypoglycemia has been reported in one case; the autopsy showed necrosis of one lobe of the liver.[26] Albuminuria, hypoglycemia, and azotemia may represent a generalized hypoperfusion state with multisystem involvement including intestinal necrosis.

Associated Conditions

As already mentioned, congestive heart failure on the basis of atherosclerotic heart disease, valvular heart disease, cardiac arrhythmia, and myocardial infarction is present in the majority of the cases.[2-4, 19, 27] The most frequent type of heart disease is atherosclerotic (40%), the most frequent valvular lesion is aortic insufficiency (33%), and the most frequent cardiac arrhythmia is atrial fibrillation (40%).[2] Malnutrition and debility have been mentioned as associated conditions.[12, 22, 28]

Since this is a hypoperfusion syndrome, other organs may be involved in the process. In one study,[29] hemorrhagic necrosis of the senile endometrium (apoplexia uteri) was found in 19 of 379 women over 50 years of age. These patients all had a history of cardiac disease. Of the 19, hemorrhagic enteropathy was noted in six (32%).

Pathological Findings

The pathological changes are similar irrespective of the type of heart disease or other associated conditions. Ileum is the most frequently involved part of the bowel followed by jejunum, colon, stomach, duodenum, and rectum.[3, 19] The affected segments are distended, and the mucosa is dark-red with patchy areas of hemorrhage. In 50 per cent the lumen of the bowel may contain blood.[19] There is no thrombosis of mesenteric vessels. Microscopically, the necrotizing and hemorrhagic process involves the whole of the mucosa, but the muscularis mucosae is usually spared. Involvement of other layers and perforation are rare but more common with thrombotic occlusion. Hemorrhagic peritoneal fluid is found in 20 per cent of the cases.[19]

Diagnosis

The clinical features are not well defined and are nonspecific. Therefore, a high index of suspicion is required to diagnose this condition. In the clinical setting of refractory congestive heart failure, prolonged cardiac arrhythmia and digitalis intoxication, the occurrence of abdominal symptoms and rectal bleeding should suggest this diagnosis. Plain film of the abdomen and barium study of the gastro-intestinal tract are not helpful in diagnosis. Although the abdominal and cardiac manifestations may be similar in both occlusive and nonocclusive types, evidence of ischemia in other organ systems manifested by hypoglycemia, azotemia, and metabolic acidosis favors the nonocclusive type. Abdominal pain and tenderness, absent bowel sounds, and peritonitis are more common in occlusive disease; rectal bleeding is a dominating and common feature in the nonocclusive disease.[30] Diagnostic differentiation of occlusive and nonocclusive disease is important because laparotomy is contraindicated in the latter as operative manipulation would further reduce intestinal perfusion. The only definitive differential diagnostic procedure is demonstration of occlusion by selective mesenteric angiography.

Treatment

Treatment of this condition at present is unsatisfactory, and mortality is high. Intravenous procaine, sympatholytic and vasodilating drugs have been considered, but these may further lower systemic blood pressure.[31] Adequate circulating blood volume should be maintained, congestive heart failure and cardiac arrhythmia should be treated, but overdigitalization should be avoided. Serial epidural block was shown to be beneficial in five cases of postoperative mesenteric ischemia, but the series is too small for valid conclusions.[32] Low molecular weight dextran has been useful in peripheral arterial insufficiency;[33] in dogs, low molecular weight dextran prolongs bowel viability in experimental strangulation obstruction.[34] There is some clinical and experimental evidence that intravenous phenoxybenzamine or glucagon may be useful, but their value is not clearly established.[35] Nasogastric suction should be instituted as bowel distention causes further decrease in intestinal perfusion.[36] As the incidence of infection is very high, appropriate antibiotics should be used. Surgery should be avoided as anesthesia and the stress of surgery may further reduce intestinal perfusion; however, if perforation has occurred, surgery is indicated.

Case One

A 70-year-old white male with chronic congestive heart failure due to atherosclerotic heart disease had persistent proteinuria. He had taken digitoxin 0.15 mg daily for many months before admission. He had cardiomegaly with functional mitral incompetence, hepatomegaly, and peripheral edema. The electrocardiogram showed atrial fibrillation with occasional ventricular extrasystoles. He was refractory to attempts at diuresis with various combinations of drugs. The dose of digitoxin was increased to 0.2 mg daily. During his hospital stay, the patient developed abdominal distress and generalized abdominal tenderness. He developed melena. He was never in shock. Autopsy showed healed myocardial infarction of the left ventricle and biventricular enlargement. The small and large bowel showed patchy areas of hemorrhagic necrosis of the mucosa. There was no occlusion of mesenteric vessels.

Comment: Note refractory congestive heart failure, atrial fibrillation, digitalization, proteinuria, and absence of shock. The autopsy findings were characteristic.

Case Two

A 48-year-old white male with known aortic incompetence was admitted with complaint of upper abdominal pain of one day's duration. He had been taking digitalis and Hydrodiuril® and was never clinically decompensated on this regimen. Physical examination revealed a thin man in acute distress, blood pressure 220/55, pulse 120 per minute of Corrigan type. He had cardiomegaly, a murmur of aortic incompetence, marked epigastric tenderness, and 4+ stool guaiac. An electrocardiogram showed complete atrioventricular dissociation. The leukocyte count was 32,800; the hematocrit, 50%; blood urea nitrogen, 35 mg/100 ml; blood glucose, 50 mg/100 ml. Roentgen film of the abdomen showed no evidence of intestinal obstruction. Nasogastric aspiration obtained dark blood. The hematocrit fell to 31%, and blood pressure to 130/0. An upper gastrointestinal x-ray study showed no varices or ulcer. The nasogastric tube aspirant continued bloody, and death occurred on the following day. Autopsy showed healed rheumatic aortic valvulitis, dilatation and hypertrophy of the left ventricle, diffuse necrosis and hemorrhage of small and large intestine with blood in the lumen, and marked centrilobular necrosis of the liver. No mesenteric thrombosis was seen.

Comment: Note aortic incompetence, abdominal pain and tenderness, cardiac arrhythmia, absence of clinical congestive heart failure, leukocytosis, slight azotemia, and hypoglycemia. Also note that abdominal symptoms preceded hypotension. The autopsy findings were characteristic.

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(Continued on page 477)

Esophageal Moniliasis

Radiographic, Endoscopic, and Pathologic Criteria for Diagnosis

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ESOPHAGEAL MONILIASIS is an important clinical entity which appears to be more commonly present than previously realized. The spectrum of presentation is varied, but painful dysphagia is the most common symptom. The importance of the diagnosis lies in its ready responsiveness to treatment versus its morbidity and mortality when undiagnosed.

Our case is a brittle diabetic with esophageal moniliasis. The patient manifested an unusual presentation, lack of diabetic control, and refractivity to the usual forms of therapy. Radiographic, endoscopic, and pathologic criteria for diagnosis will be presented.

Case Report

The patient was first seen at the Bethany Medical Center in December 1970, at which time she came in for control of her diabetes. She gave a history of diabetes since age 14, and of brittle diabetes since receiving corticosteroids for hepatitis one year prior to admission. She had taken no steroids for the six months prior to admission. Three months prior to admission, she was noted to have albuminuria, peripheral edema, and dyspnea. One month prior to admission, transient right eye blindness had been noted.

Physical examination on admission revealed hypertension with a blood pressure of 170/100; Grade IV diabetic retinopathy; left CVA tenderness; and 1+ peripheral edema.

Laboratory studies showed hemoglobin level of 8.6 gm/100 ml; serum proteins, 5.7 gr/100 ml; urine proteins, 24 gr/24 hrs. Blood sugars ranged from 82 to 1,048 mg/100 ml. Creatinine clearance was 38 cc/min.

On this admission, a urinary tract infection was discovered with Escherichia coli greater than 100,000 colonies/ml. The patient was treated with antibiotics and improved. No gastrointestinal symptoms were present.

The patient was next seen in March 1971, at which time she presented with nausea, vomiting, and eventually mild hematemesis. Low fever was present and urinary tract infection was suspected. Treatment with ampicillin was begun, but on the fourth hospital day her diabetic control worsened and she complained of moderately severe epigastric distress. Upper gastro-intestinal series was performed and reported as normal. Esophagoscopy was then carried out and revealed a rather diffuse adhesive plaque-like lesion over the lower two-thirds of the esophagus, with an area of friability below this lesion. The gastric vault was essentially normal. After initiating the treatment with 500,000 units of nystatin, the epigastric distress was considerably less four days later. Seven days later, the postendoscopy was gone. Her diabetes subsequently came under control and she was discharged. Biopsy taken at the time of endoscopy showed only "esophageal squamous mucosa with focal inflammatory changes."

Three months later she was readmitted with nausea, coffee ground emesis, and epigastric distress. She also had symptoms of congestive heart failure, cough with yellow sputum, dysuria, frequency, and urgency. Initial treatment consisted of digoxin, furosemide, cephalothin, gentamicin and mycostatin, but gastrointestinal symptoms again worsened. An

A case of esophageal moniliasis is presented. The patient was a brittle diabetic and had the unusual presenting symptom of epigastric pain. Endoscopic, radiographic, and pathologic criteria for diagnosis are described. Initially, Nystatin gave a beneficial response, but finally Amphotericin B had to be used to achieve cure.

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esophagogram showed irregularity of the mucosa, nodularity, pseudotumor formation, and deep ulceration *(Figure 1)*. Esophagoscopy showed continued evidence of esophageal candidiasis. Esophageal biopsy showed candida mycelial phase within the mucosa, confirming the diagnosis. Amphotericin B therapy was then started, with an initial dose of 1 mg. This was gradually increased to 20 mg every third day. A total of 126 mg of amphotericin B was given and repeat endoscopy revealed clearing of the infection.

The patient was asymptomatic at the time of discharge, but returned one month later with similar gastrointestinal complaints as reported above. This time, the upper gastrointestinal (UGI) series showed mucosal irregularity of the lower esophagus and a pseudostricture of the esophagus *(Figure 2)*. Endoscopy revealed a 4-5 cm area of friability, erythema, and patches of white exudate clinging to the mucosa. The biopsy again showed candida mycelial phase within the mucosa. After four days of combined nystatin-amphotericin B treatment, the symptoms had subsided. However, repeat UGI twelve days later continued to show esophageal narrowing. The patient was discharged on oral nystatin.

The patient has had two additional admissions for various problems related to her diabetes and renal disease, and has even been treated with antibiotic, but has had no recurrence of her gastrointestinal symptoms. Repeat UGI on one of these admissions was within normal limits *(Figure 3)*. Endoscopy at this time showed clearing of the infection and mild erythema of the esophageal mucosa. Recent motility study also showed normal peristaltic activity.

Figure 1. The x-ray shows irregularity and nodularity of the mucosa, pseudotumor formation, and a deep ulceration.

Figure 2. The pseudostricture is located in the distal esophagus.

Figure 3. After treatment, this esophagogram shows no abnormalities.

Discussion

The true incidence of esophageal moniliasis varies with various series, but until September 1970, only 70 cases had been reported in the world literature.[2] Since then, 13 additional cases have been reported.[1–3] Most likely, the incidence is much higher, particularly in patients with predisposing diseases. In the adult, esophageal moniliasis is often predisposed by conditions such as diabetes mellitus, general debility, tuberculosis, blood dyscrasia, steroids, neoplastic diseases, broad spectrum antibiotics therapy, and hypoparathyroidism *(Table I)*.

TABLE I

PREDISPOSING FACTORS IN ESOPHAGEAL MONILIASIS

1. Diabetes mellitus
2. General debility
3. Tuberculosis
4. Blood dyscrasias
5. Steroids
6. Neoplastic diseases
7. Broad spectrum antibiotics therapy
8. Hypoparathyroidism

Of 694 patients with neoplastic disease studied by Jensen, 5 per cent had esophageal moniliasis.[4] Autopsy data of gastrointestinal moniliasis showed an incidence ranging from 4 per cent in patients with chronic leukemic disease, to 27 per cent in patients with lymphosarcoma. The esophagus was the most common site of envolvement.[5]

The most common presenting complaint is dysphagia *(Table II)*.[2–4, 6–8, 10, 12–13, 15] Fifty-five per cent of the patients in Jensen's study had odynophagia.[4] Retrosternal pain and obstruction of the food passage were also frequent symptoms. One case reported by Gonzales had epigastric pain.[1] On the other hand, gastrointestinal bleeding was the major symptom reported by Sherlock *et al.*[5] However, the majority of their patients had blood dyscrasia.

The diagnosis of esophageal moniliasis must be entertained in any patient with a predisposing illness who presents with progressive dysphagia. The presence of oral candida may lend credence to the diagnosis, but its absence definitely does not rule out esophageal involvement. Fifty per cent of patients with esophageal moniliasis do not have oral lesions. A positive culture from the oropharynx without mucosal involvement is likewise not helpful.

To make a definitive diagnosis of esophageal moniliasis, barium swallow and esophagoscopy with cultures and biopsy should be performed.

The radiographic literature is abundant with reports and descriptions of esophageal moniliasis since

TABLE II

CLINICAL FINDINGS IN ESOPHAGEAL MONILIASIS

1. Dysphagia
2. Odynophagia
3. Substernal pain
4. Esophageal obstruction
5. Epigastric pain
6. Nausea and vomiting
7. Hematemesis

the first description by Andren and Theauder in 1956.[6] Reviewing the radiographic reports, Guyer *et al.*[3] found the following features salient:

1. The distribution is primarily in the lower and middle thirds of the thoracic esophagus.
2. A shaggy outline is common due to mucosal ulceration or slough within the lumen of the esophagus.[3, 4] Loss of mucosal folds may occur.[6, 7]
3. Deep ulceration gives an appearance similar to that in the colon in ulcerative colitis. In fact, changes compatible with intramural esophageal diverticulosis have been described.[8]
4. Nodular filling defects are often present and may be caused by mucosal edema, ulceration, pseudomembrane, or by actual colonies of candida on the surface of the esophageal mucosa.[9–11] This has been designated as a "cobblestone" esophagus by Goldberg.[12]
5. Esophageal spasm is particularly common and makes barium swallow hazardous in children as contrast media may be aspirated.[11]
6. Diminished esophageal peristalsis occurs and contrast media may fail to enter the stomach when the patient is supine.[3]
7. Segmental narrowing is frequently described and may be due to inflammation and fibrosis, or to inflammation extending to the inner layer of the muscularis,[13] but commonly, it is a pseudomembrane which clears with treatment.[11, 14]
8. Response to treatment may occur within a few days. In fact, in the absence of endoscopic or bacteriologic proof, the clinical and radiologic response may be of diagnostic value.

The radiographic differential diagnosis includes esophageal varices, peptic esophagitis, intramural diverticulosis, and more remotely inflammatory bowel disease.

These features may be pathognomonic for esophageal moniliasis, particularly with a clinical history of painful dysphagia. However, many proven cases of esophageal moniliasis have negative barium swallows early in the course of their disease. Therefore, endoscopy and biopsy are of extreme importance for early diagnosis and treatment.

At endoscopy, the findings of esophageal moniliasis are distinctive *(Table III)*. A yellowish exudate is seen adherent to the involved areas of the esophagus. There may be surrounding esophagitis, ulceration, and pseudomembrane formation. Removal of the plaque-like exudate results in bleeding. Biopsy should be obtained for histopathology and fungal cultures.

The biopsy confirms the diagnosis of esophageal moniliasis when the organism in the mycelial phase is seen within the mucosa with resulting destructive changes. These changes include marked mucosal inflammation, erosion, ulceration, whitish plaque-like material, pseudomembranes, and pseudotumor formation *(Table IV)*.

TABLE III

ENDOSCOPIC FINDINGS IN ESOPHAGEAL MONILIASIS

1. Yellowish exudate
2. Esophagitis
3. Ulceration
4. Pseudomembrane
5. Friability
6. Nodularity

Treatment

At the present time, two antifungal agents are in common usage. The first of these, nystatin, is the agent most commonly used primarily because of its effectiveness, ease of administration, and low toxicity. Various means of administration have been suggested, but frequent administration of a viscous suspension seems to be the most beneficial in refractory cases. This allows more drug absorption into the cellular membrane of the yeast.[15] Some investigators have suggested prophylactic administration of nystatin to patients with predisposing illnesses whenever concomitant steroids or antibiotics are to be given. The usual dosage range of nystatin is 250,000 to 500,000 units every 4 to 6 hours.

In general, amphotericin B has been reserved for systemic or deep seated candida infections, but Jenson treated 23 cases with amphotericin B as the initial therapy with beneficial response.[9] There were no serious side effects. However, chills, fever, nausea and vomiting, as well as thrombophlebitis at the injection site, did occur. The dosage range for amphotericin B is 20 to 25 mg a day. Initial dose should be 1 mg, gradually increased over 4 to 5 days until the normal range is reached. Dosage reduction should be made if the blood urea nitrogen (BUN) rises, since renal dysfunction is a frequent serious complication.[5]

TABLE IV

PATHOLOGIC FINDINGS IN ESOPHAGEAL MONILIASIS

1. Pseudohyphae within the tissues
2. Mucosal inflammation
3. Ulceration
4. Granulation tissue

Discussion

Our patient had an unusual presentation, *i.e.,* epigastric pain. To our knowledge, this presenting symptom is reported in only one other case.[1] She was predisposed to moniliasis by her diabetes, general debility, and frequent treatment with broad spectrum antibiotics. Initial UGI early in the course of the disease was normal, but later showed classic radiologic findings of esophageal moniliasis. Eventually, there was radiographic criteria of a stricture, but this cleared with treatment. Endoscopy and biopsy confirmed the diagnosis and were valuable for early diagnosis, as well as clinical followup. Initially, she responded to treatment with nystatin but eventually became refractory. Cure was achieved with amphotericin B.

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Dr. Brock offered the following, which was adopted:

WHEREAS, On the fourth day of the Proceedings of the American Medical Association of 1869, a resolution, by Dr. Moore, was adopted, that

WHEREAS, The contract system is contrary to medical ethics.

"*Resolved,* That all contract physicians, as well as those bidding for practice at less rates than those established by a majority of regular graduates of the same locality, be classed as irregular practitioners."

Resolved, That the interpretation of this society, the design was in no wise to effect the usual contracts rendered necessary to secure efficient attendance on the poor of the city or county; nor the contracts necessary to meet deficiency of medical officers under certain circumstances of emergency in the army. But that any person who contracts to attend families by the year at a stipulated price, or who charges less than the established price determined by a majority of the regular physicians in his locality, is in clear violation of the above resolution, and should therefore be classed as irregular.

(From the transactions of the 1871 annual meeting of the Kansas Medical Society, as reprinted in the Centennial Issue, 1959.)

Open Ward Psychiatry

Psychiatric Services in a General Hospital

WILLIAM TARNOWER, M.D., ***Topeka***

The presence of an open psychiatric unit in a general hospital—of which the unit at Stormont-Vail is an example—can successfully meet community needs for inpatient psychiatric care. The general hospital has special advantages in that it has a tradition of up-to-date treatment and rapid recovery from illness. It can minimize the despair and negativism that frequently accompany the diagnosis of a psychiatric illness by avoiding inflexible restrictions and providing humanely warm staff contacts.

Topeka, Kansas, population 127,000, is a nationally recognized psychiatric center. However, many of its citizens preferred not to enter the Topeka State Hospital; others were unable to utilize the local private psychiatric hospital; few were eligible for services at the Veterans Administration Hospital. Apprehension, fears of symptoms that might upset other patients or staff, and the possibility of suicide or physical violence to others tended to keep admissions of emotionally disturbed patients to a minimum in local general hospitals. Thus, Topekans requiring psychiatric hospitalization often went to out-of-town facilities or did without.

In April 1969, Stormont-Vail Hospital, a 400-bed general hospital, opened a 17-bed psychiatric unit, as the inpatient psychiatric service of the Shawnee County Mental Health Corporation, bringing to fruition many years of planning by members of the hospital staff and members of the hospital community.

As plans for a new unit and new departments of social work, occupational therapy, and psychology began to emerge, the psychiatric staff organized a Department of Psychiatry.

To provide coordination for the overall organization of the psychiatric area, a clinical director, essentially a psychiatric consultant, was employed. He has provided guidance, support, and professional leadership on a scheduled daily basis.

Nursing staff was recruited for the psychiatric unit by informing the staff (previously a medical area) that they were welcome to remain and participate in the development of a psychiatric unit. Those who preferred not to stay could request transfers to areas of their preference. Thus, the nursing staff was self-selected and lacked experience in any traditional psychiatric setting, an important advantage in this case because the staff started without presuppositions about the potential effectiveness of the unit. Their experience had been with patients who recovered rapidly, within a few days or a few weeks. They expected psychiatric patients to respond similarly. (The general operation of the hospital, where workups are usually completed within 24 to 48 hours, gave impetus to the conviction that the patients would be examined, treated, and discharged in a relatively short period of time.) As staff anxiety developed, it was channeled into developing programs for the unit and into inservice training to improve professional skills.

Although the following departments are autonomous and separate from the psychiatric unit, they were developed because of the psychiatric unit, and they work closely with it. They are increasingly influencing patient care throughout the hospital.

Social Work

A Department of Social Work began operation in February 1970. By December 1971, the psychiatric social worker had seen 595 cases referred by 67 physicians. She assisted in making referrals to community resources: welfare agencies, local hospitals, and halfway houses for alcoholics. She helped hospital patients adapt to their illnesses and assisted families in coping with issues relating to death, finances, and disability. She participated in the methadone program, consulted regularly with nursing staff on the adolescent unit, and gave educational talks to groups in the hospital and in the community. She provided new services which added new dimensions to the quality of care and improved staff morale.

Presented at the annual meeting of the Kansas Chapter, American College of Physicians, Topeka, Kansas, February 25, 1972.

Psychology

A psychologist was available on a part-time basis from January 1970 to January 1971 to provide clinical services. She administered psychological tests for members of the departments of psychiatry, pediatrics, and neurology. As a member of the treatment team, she attended the daily meetings on the psychiatric service and participated in discussions of ward management, the therapeutic use of the milieu, and the understanding of patient pathology. She was active in educational programs for the nursing staff and provided consultation to various department heads in the hospital on psychological aspects of personnel selection, placement, and management.

Occupational Therapy

From its beginning in October 1969 as an activities department, the service evolved into an occupational therapy department in September 1970, when a registered occupational therapist joined the staff. The department has grown rapidly with addition of new staff, new programs, and increased services to patients. In the last 18 months, 654 medical-surgical patients, 154 orthopedic patients, and 528 psychiatric patients have been referred to this department for treatment by 91 of the 170 physicians on the hospital staff. In addition, the department has provided supervision for a daily play group on the pediatrics floor of the hospital, it has been the guiding force in the establishment of a geriatric activities group on the orthopedic area, and it is currently working on a proposal to establish an acute rehabilitation unit for disease processes which result in a major change in a patient's life style—cerebrovascular accidents, spinal cord injuries, and other problems.

Structural Changes

Consultations with professional clinicians, administrative and engineering staff, and visits to other hospitals produced ideas that were incorporated into plans for the psychiatric unit. Structural changes were carefully considered based on the conviction that living arrangements and activities provided a meaningful aspect of treatment. There were plans for a lounge and TV area, a reading room, a washer and dryer, a pool table, table tennis, and a room where the doctor and patient and family could visit quietly. The final results met the needs outlined by the clinical staff, administration, and the engineering department.

Psychiatric Unit

Admissions to the psychiatric unit are voluntary and follow the usual hospital admission procedures. The unit is completely open, without locked doors, and with the same visiting policies that prevail in other parts of the hospital. Patients have the privilege of communicating with others by phone or letter. Patients keep their personal belongings, are not searched, and are allowed to keep their clothing in their rooms. This policy applies also to suicidal patients. Nursing staff or the attending physician, however, have the prerogative in any given case to order whatever restrictions they deem necessary. Exceptions to the general policy are not frequent.

When the unit opened, only psychiatrists could admit and have responsibility for patients on the area. Within a year, however, the policy changed so that any staff physician had the privilege of admitting directly to the unit and caring for his patients there. This policy has immeasurably improved the relationship between psychiatric, medical, and surgical staff. Psychiatric staff were available to provide psychiatric consultation or to accept primary responsibility for the patient's care. This mode of operation has worked well. A patient on the unit who is not referred to a psychiatrist for consultation or treatment is the exception, rather than the rule.

From its inception, the psychiatric area has placed emphasis on the therapeutic value of patient-staff relationships, the understanding of the social and psychological factors influencing the patient's current life situation, the use of psychotropic medications, and the importance of a therapeutic milieu.

Surprisingly, although the majority of the patient population is acutely disturbed, heavy doses of psychotropic drugs are seldom administered. Chemical restraint is not a primary treatment modality, although it is used when necessary for combative or extremely agitated patients. Human restraint in the form of a staff member staying with the patient is the primary approach to anxious and disturbed individuals. The fact that no serious injuries to either staff or patients have occurred is presumed to be due to the effectiveness of basic staff attitudes. Patients are not threatened or challenged by unusual rules or restrictions. Two rooms designated as maximum security rooms are similar to other rooms, except that all furniture can be removed from them and they have locks on the doors. These rooms are infrequently used for maximum security, and then only for relatively brief periods of time measured in hours rather than days. While other physical restraints (belts, leather cuffs) are available, they are rarely used.

Instead of traditional maximum security, personal investment by staff in patients is the goal. As an indication of the attainment of the goal, only five patients have left the hospital without foreknowledge by the staff. In no instance has there been serious sequelae. Similarly, while there have been a number of suicidal attempts, none has been successful, as

staff was almost immediately aware of the incidents. When it is suspected that the patient has a private source of drugs, open discussion of the problem by the staff with the patient has been adequate to deal with the problem in this setting.

Issues relating to confidentiality, particularly material recorded on the patients' charts, were for many months an area of concern to the medical and nursing personnel. The possibility of having two records, with psychiatric material under lock and key at all times, was considered. It was finally decided that psychiatric charts would not be handled differently from other charts. To date, this procedure has been satisfactory. There have been no complaints, and ongoing review of the charts reveal that pertinent information is recorded, respecting the need to limit sensitive details about the patient's life and behavior.

Originally, it was anticipated that it would be disruptive to admit patients under 18 years of age to the unit. But as physicians requested admission for younger patients, and as staff experience and clinical judgment deemed it possible, admissions included a substantial number of adolescents and even a few preadolescents. No patient has been denied admission because of age or severity of illness. One limitation that is reasonably firm (there have been two exceptions) is that no patient is to be admitted under court order. The presence of uniformed police and constant maximum security conflicts with the basic philosophy of flexibility of treatment by the staff and freedom of participation for the patient.

Statistics

From the first admission in April 1969 to December 31, 1971, 795 patients were admitted to the unit. The conviction that this unit would be able to provide short-term care for a large number of individuals with satisfactory results is borne out by the following statistics: 84.3 per cent of the patients returned to the community, to their families, and to their work within 30 days; 7.6 per cent were transferred to long-term psychiatric facilities; 4.4 per cent were referred to nursing homes and other facilities such as jails, orphanages, or boarding homes; 2.3 per cent left against medical advice. The average length of stay has not changed significantly since the unit opened, remaining at approximately 9 to 10 days. The return rate over the 33 months of the unit's operation is 8.8 per cent.

It is worthy of note that although 31.6 per cent of the patients were depressed on admission and 18.9 per cent were diagnosed suicidal on admission, electroshock therapy has been administered to only one patient.

There have been no hard and fast rules about maintaining the short-term nature of the unit by restricting patient stay to approximately 30 days. To date, 43 patients have remained in the unit for over one month, the longest remaining four months. The other 42 patients were discharged within a period of two months.

Feedback from attending physicians indicates that most discharged patients are seen in followup visits or outpatient treatment, and are doing well.

Conclusion

The presence of an open psychiatric unit in a general hospital—of which the unit at Stormont-Vail is an example—can successfully meet community needs for inpatient psychiatric care. The general hospital has special advantages in that it has a tradition of up-to-date treatment and rapid recovery from illness. It can minimize the despair and negativism that frequently accompany the diagnosis of a psychiatric illness by avoiding inflexible restrictions and providing humanely warm staff contacts.

The treatment results with a very broad spectrum of psychopathology have been remarkably good. And the benefits of the psychiatric services have accrued not only to the psychiatric patients, but to all the patients in the hospital.

Acknowledgment

Appreciation is expressed to the staff of the Stormont-Vail Hospital who made this paper possible.

Nonocclusive Hemorrhagic Bowel Necrosis

(Continued from page 469)

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Letters to VOX DOX should be addressed to the Vox Dox Editor, Journal of the Kansas Medical Society, 1300 Topeka Avenue, Topeka, Kansas 66612.

Prodromata of Hepatitis

Skin Manifestations Associated With Australia Antigen

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Over the past five years, information about the Australia antigen, its antibody, and hepatitis associated with this antigen has been reported.[1] Sophisticated immunological and biochemical laboratory procedures have aided in the detection of asymptomatic carriers, thereby decreasing the spread of Australia antigen-hepatitis, especially by blood donors, and, hopefully, resulting in earlier detection and more effective treatment.[2-7]

THE PREICTERIC SYMPTOMS of viral hepatitis, such as anorexia, fatigue, malaise, fever, headache, and myalgia are well known but are non-specific. The earlier literature on viral hepatitis, based on large series of patients, mentioned a low incidence of arthralgias and skin eruptions as preicteric symptoms with the latter occurring in 1 to 5 per cent of patients diagnosed as having infectious or serum hepatitis.[8, 9, 11] For many years, premonitory skin manifestations of hepatitis were not well appreciated. However, in 1959, Mirick and Shank[10] reported that in a study of 241 icteric patients with hepatitis, 15.1 per cent presented with urticaria, 7.3 per cent with pruritus, and 4.1 per cent with a maculopapular eruption. Presently, with the rising incidence of hepatitis associated with increased drug abuse, several recent reports have emphasized the arthritic component of hepatitis, as well as the transient cutaneous signs and symptoms.[12, 13]

This paper will deal specifically with the premonitory skin manifestations of hepatitis associated with Australia antigen. Three consecutive cases seen over a ten-month period at the Wesley Medical Center in Wichita are used as illustrative examples.

Case One

On January 10, 1971, an 18-year-old white female was seen in the emergency room with urticaria. The lesions were pruritic, erythematous, and located over the entire body. The urticaria cleared rapidly after initial treatment with steroids and antihistamines, only to recur two days later. She continued to have intermittent and recurrent urticaria, subsequently developed angioneurotic edema accompanied by hoarseness, and began to pass deep orange urine. Nine days after onset of initial symptoms, she was admitted to the hospital for evaluation and treatment.

The review of systems revealed the patient had a transient aching pain in the right knee accompanied by aching in both thighs two days prior to admission. She had mild anorexia on the day of admission. The patient did admit to intravenous drug abuse, but claimed she had used no drugs for the past two months prior to admission, nor had she been exposed to anyone with hepatitis. Except for a slight scleral icterus, resolving urticaria, faint purpura of the inner thighs, and old antecubital scars, the physical examination was within normal limits. The patient was afebrile.

Admission laboratory data included the following values: bilirubin, 2.5; alkaline phosphatase, 27.3 (normal: 3.6-13.1); serum glutamic oxaloacetic transaminase (SGOT), 960 (normal: 5-35). The electroimmuno diffusion test on her serum revealed Australia antigen. Except for bile in the urine, all other laboratory data was normal.

On the seventh hospital day, the bilirubin was 8.3; alkaline phosphatase, 21.8; SGOT, 780.

The patient was treated with antihistamines; by the third hospital day, the urticaria had cleared and this medication was discontinued. By the ninth hospital day, although jaundiced, the patient felt asymptomatic and left against medical advice. She was seen ten days later as an outpatient and showed complete clearing of the jaundice.

Comment

This case of hepatitis associated with Australia antigen illustrated that the main complaint, and presenting symptom, was pruritic urticaria. With the onset of jaundice, the urticaria rapidly cleared. Admittedly, this patient was a poor historian, but upon repeated questioning she denied any type of recent drug use which might have induced a cutaneous drug reaction. There was no eosinophilia to suggest

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a drug hypersensitivity. The epidemiologic fact that this patient had two friends who had shared her needles, and also had urticaria but were anicteric, was most interesting. Unfortunately, they refused to be evaluated.

Case Two

A 22-year-old Negro female developed a pruritus on August 19, 1971, which started on the arms and shoulders and later became generalized. Two days later, the patient was seen in the emergency room for erythema multiforme-like lesions localized mostly on the arms and legs, but also found on the trunk and face. This responded transiently to steroids and antihistamines. Because of several recurrences, increasing numbers of lesions and a poor response to treatment, the patient was hospitalized two weeks after the onset of her symptoms. The patient had a history of recent drug abuse.

Her physical examination was unremarkable except for the skin lesions mentioned above, and vaginitis. She was afebrile. There was no scleral icterus and no evidence of arthritis. The patient complained only of pruritus and aching in the muscles of her arms and legs.

Except for SGOT of 250, and a sedimentation rate of 21, all other admitting laboratory work was within normal limits.

One week later, the bilirubin rose to 1.5, alkaline phosphatase was 21.3, SGOT was 330, and the test for the Australia antigen was positive. During the first week of hospitalization, the patient left the hospital for several hours. After her return, a check on her urine revealed heroin and its metabolites.

By the 14th hospital day, the blood chemical values were as follows: bilirubin, 4.7; alkaline phosphatase, 26.2; SGOT, 1000. By the 24th hospital day, the bilirubin had decreased to 3.3; alkaline phosphatase, 22.0; SGOT, 287.

With the use of antihistamines, the patient's hospital course was marked by a rapid clearing of the erythema multiforme by the fourth day after admission. The patient was seen on one occasion as an outpatient and had normal SGOT.

Comment

This patient's presenting symptom was pruritus followed by erythema multiforme. Although the SGOT was elevated on admission, the bilirubin did not rise until three days after the skin lesions cleared. The fact that this patient was still abusing drugs after her erythema multiforme cleared and was not under treatment, strongly suggests the erythema multiforme was not drug-induced.

Case Three

On September 13, 1971, a 30-year-old Negro female developed pruritus on the soles of her feet. This was followed two days later by a fine papular eruption on the ankles which, during the next three weeks, spread over her entire body. One week prior to admission, the patient noticed a yellowish tint to her sclera, dark orange urine, and clay colored stools.

On October 14, 1971, the patient was seen in the emergency room and was admitted to the hospital. She complained of a generalized headache and marked pruritus and anorexia. The patient gave no history of drug ingestion or of needle injections, nor did she recall being exposed to hepatitis. The pertinent physical findings included fine papular eruption, coarse dry skin, icteric sclera, right chorioretinitis, a geographic tongue, and tenderness in the upper right quadrant.

Significant admitting laboratory data included: bilirubin, 10.0; SGOT, 250; alkaline phosphatase, 13.5; bile in the urine, and presence of the Australia antigen in her serum.

One week after admission, SGOT was 1005; alkaline phosphatase, 22.2; bilirubin, 12.0. By the third week, SGOT was 1810; alkaline phosphatase, 24.3; bilirubin, 17.6. The reticulocyte count was 3.5, and a red cell survival study indicated a shortened red cell life span.

The patient's hospital course was marked by a rapid clearing of her skin eruption by the second day after admission, but she continued to have intermittent pruritus. The patient was treated with antihistamines, cyproheptadine hydrochloride, and topical steroids. The patient's appetite and strength gradually improved and she was discharged on November 2, 1971, at which time her bilirubin was 7.1.

Outpatient followup revealed continued symptomatic improvement as well as a slow improvement in the liver profile. One month later, the bilirubin was 1.7; SGOT, 38; alkaline phosphatase, 16.6.

Comment

Pruritus preceding a fine papular skin eruption marked the premonitory skin manifestations in this case of hepatitis associated with Australia antigen. This patient completely denied exposure to others with hepatitis or to transdermal inoculations. Her eruption persisted longer than those in the first two cases, corresponding to the longer duration of hepatitis and possibly more severe involvement. In addition, this patient did develop a hemolytic anemia, which has been described as one of the systemic manifestations of hepatitis.[14]

Discussion

The above three cases of hepatitis associated with a positive test for the Australia antigen illustrate that non-specific skin lesions such as urticaria, ery-

thema multiforme, or a papular eruption may precede the onset of icterus by approximately one to three weeks. In all three cases, with or just before the onset of jaundice, the skin lesions rapidly disappeared. Pruritus was associated with all of the skin lesions presented in the three cases. Only one of these three cases had arthralgia. The main prodromata of all three patients were their skin problems.

The mechanisms and mediators of skin manifestations involved in viral diseases are not well understood. The direct toxic effect involving mediators of the inflammatory reaction is a possibility. The humoral and cellular mediated responses have also been implicated in skin manifestations of viral disease. Breakdown products of either the host cell or of the viral protein coat may play a role. For example, the premonitory skin manifestations of hepatitis resemble the occasional complication of smallpox vaccinations, and these are thought by most investigators to be an allergic reaction to virus components.[15] The presence of the Australia antigen indicates that the premonitory skin manifestations may be directly or indirectly related to the hepatitis virus. Furthermore, the Australia antigen has recently been associated with Gianotti-Crosti syndrome, a disease of children characterized by a papular eruption, lymphadenopathy, and hepatitis.[16, 17] A similar mechanism may be playing a role in this disease, about which little is known.

In conclusion, the three cases presented along with a review of substantiating literature,[12, 13, 18, 19] indicate there may be a significant incidence of premonitory skin manifestations preceding hepatitis associated with the Australia antigen. These skin manifestations include urticaria, erythema multiforme, and a papular eruption. Not all cases of hepatitis will manifest with jaundice, but some may have only these cutaneous signs.[10] These cutaneous signs in association with a compatible history, such as drug abuse, may serve not only as a means for earlier detection and for treatment, but also for prevention of spread of hepatitis.

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Respiratory Failure

Direct Visualization of the Bronchial Tree

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In the past, conventional therapeutic bronchoscopy was recommended only as a last resort. Its therapeutic value was far outweighed by the associated hazards and was contraindicated in severe respiratory failure. We soon discovered that direct passage of the flexible fiberoptic bronchoscope through an endotracheal tube or tracheostomy tube was possible and permitted rapid assessment of tube placement, airway patency, adequacy of secretion removal, and cultural collection.

Although we have previously reported the diagnostic usefulness by the transnasal method, this paper describes experience with 147 therapeutic bronchoscopies in 69 patients during respiratory failure; 101 endoscopies were done by the transendotracheal route and 46 through a tracheostomy port.

The 5 mm diameter fiberoptic bronchoscope has an operating length of 55.7 cm, a remotely controllable tip, and a 1 mm suction port through which secretions can be removed or solutions instilled. The scope can be passed under direct visualization to the subsegmental level with visual access beyond. Appropriate cameras permit still and motion picture photography.

Initially, the bronchoscope was used for brief intermittent periods with the endotracheal tube disconnected from the ventilator.

Development of an adapter assembly allowed closed therapeutic bronchoscopy in patients with endotracheal tubes or tracheostomies while on a ventilator. The adapter consists of an endotracheal cuff balloon fixed inside a plastic cylinder. Inflation of the balloon around the bronchoscope produces an airtight seal and maintains a closed system.

To insure safety of the procedure, the effect of the bronchoscope on flow resistance and on blood gas homeostasis was studied. To study flow resistance changes, the closed system was connected to a volume ventilator which maintained 500 cc tidal volume at a rate of 12 per minute. A balloon with a normal lung compliance was attached to the distal end of the endotracheal tube. Differential pressure between the proximal and distal ends of each tube was recorded.

Episodes of acute respiratory failure in patients with chronic obstructive pulmonary disease are an increasing problem in clinical medicine. Many of the lung's normal clearance mechanisms are altered by the disease process. One of the major reasons for decompensation is retention of secretions which become inspissated producing bronchial plugging. An intensive program of bronchodilation, aerosol therapy, frequent endotracheal suctioning, postural drainage, and chest physiotherapy have proven helpful but often inadequate.

Endotracheal tubes ranged in size from 7.5 to 10 mm internal diameter. As expected, with decreases in the internal tube diameter the resistance to flow through the tube increased. Upon insertion of the bronchoscope into the system, a critical rise in resistance occurred in the 7.5 mm and 8.00 mm tubes. This correlated with our clinical experience in that adequate ventilation during the procedure could be maintained only when an 8.5 mm or larger tube was used.

Arterial blood gas measurements were monitored in ten patients. Arterial blood was sampled from an indwelling bronchial artery cannula at two-minute intervals, and during and at 10 and 60 minutes following bronchoscopy. Continuous suctioning caused hypoventilation, unless compensated by increasing the tidal volume to maintain stable expired minute

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ventilation. Coughing also produced inadequate ventilation, but could be alleviated by instilling a few cc of 0.5 per cent lidocaine or tetracaine. None of the patients studied exhibited clinical or laboratory evidence of hypoxemia.

During the bronchoscopy, ventilator adjustments are made to maintain prebronchoscopy minute ventilation.

The adapter piece permits closed therapeutic bronchoscopy. The bronchoscope is inserted and then passed under direct vision down the endotracheal tube. These secretions are removed by suctioning with the aid of sterile saline lavage and sent for culture.

In another patient with severe obstructive disease and respiratory failure, we were most impressed with the marked amount of large airway collapse both before and after the addition of end expiratory pressure.

Upon completion of the procedure, the bronchoscope is withdrawn so that the tip is located just within the adapter. We would recommend that patients be bronchoscoped intermittently for two- to four-minute intervals.

One patient had a long standing tracheostomy because of progressive neurological disease with inability to handle secretions and atelectasis of the left lower lobe. The inner cannula of the steel tracheostomy tube was removed and the bronchoscope passed into the tracheobronchial tree.

Viscid secretions were seen obstructing the left lower lobe. The secretions were removed and the tree was clear to the segmental level. Sterile saline was injected which produced coughing and loosening of bronchial plugs which were beyond the segmental level. This resulted in subsequent re-expansion of the left lower lobe.

The transnasal approach can also be used in respiratory failure as the following case illustrates. A 46-year-old white female automobile accident victim had suffered cervical cord compression and was in Crutchfield tongs on a Stryker frame. The patient was hypoxemic with a chest x-ray demonstrating total left lung atelectasis. After five transnasal bronchoscopies with mechanical fracture and removal of inspissated plugs and secretions, a complete re-expansion of the left lung was achieved.

Another important use of the bronchoscope has been the immediate ability to determine endotracheal tube placement and patency. Near complete occlusion of a tracheostomy tube by the posterior tracheal wall was noted. The tube was changed and a patent airway was restored.

A compromise of the endotracheal tube lumen produced by excessive cuff inflation was corrected with proper cuff pressure which produced no intraluminal compromise in another patient.

Summary

We have related some of our observations with the fiberoptic bronchoscope in 69 patients undergoing 147 procedures during endotracheal intubations. Therapeutic bronchoscopy can provide rapid evaluation of tube placement, tube patency, and suctioning efficiency. Flow resistance curves revealed a critical rise in resistance with an internal tube diameter of 8 mm or smaller. We have been impressed by the copious amounts of retained secretions and plugs in these patients despite an intensive program of hydration, maximal aerosol therapy, and frequent suctioning. In contrast to conventional bronchoscopy, therapeutic fiberoptic bronchoscopy can be used safely as a routine procedure in all intubated patients in respiratory failure.

Acquired Circulating Anticoagulants

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In 1940, Lozner and Taylor documented the presence of circulating anticoagulant in a 61-year-old male who presented with hemorrhagic manifestations and generalized lymphadenopathy.[1] Although not characterizing the nature or site of action of the circulating anticoagulant, this first well-documented case focused attention on another possible etiologic factor in the patient with clinically abnormal bleeding. Several case reports have subsequently appeared in the literature with greater elucidation of the nature, mechanism, and site of action of circulating anticoagulants noted in a variety of clinical states.

The term "circulating anticoagulant" is now popularly employed to designate abnormal endogenous blood components of an acquired nature, which are capable of inhibiting blood coagulation despite the addition of toluidine blue or protamine sulfate.[2] Such a definition eliminates the different antithrombins from consideration, and focuses on inhibiting substances active in the first stages of coagulation. Circulating anticoagulants inhibiting Factors I, V, VII, VIII, IX, X, XI, XII, and XIII have been documented and characterized as immunoglobulins with the exception of inhibitors of Factor XIII.[3, 5–11, 21]

Factor deficiencies can be detected by means of common screening tests such as the prothrombin time, partial thromboplastin time, and thrombin time. However, these tests neither specifically indicate the deficient factor, nor determine whether the deficiency is absolute or relative; that is, whether the deficiency is due to a marked decrease or absence of a clotting factor, or due to an inhibition of its activity. Presumptive evidence for the presence of a circulating anticoagulant is obtained when the addition of normal blood or plasma does not correct the abnormal coagulation test. Normal blood or plasma contains 10 to 20 times the concentration of clotting factors needed for optimum in vitro clotting and should, therefore, correct the abnormal coagulation test if an absolute factor deficiency is the etiology.[12] Further identification of the clotting factor, toward which the anticoagulant is directed, can be made by ascertaining specific factor activity before and after the addition of normal plasma.

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The purpose of this paper is to report three cases in which a circulating anticoagulant was identified, and to review the development of current thought in regard to acquired circulating anticoagulants.

Methods

Bleeding time was determined by the Ivy method. The clotting time was a modification of the Lee-White method. The prothrombin time was performed by a one-stage method, and the partial thromboplastin time was determined by a one-stage method using celite activation. The thrombin time was determined by a modification of Hardisty's method using human thrombin (Fibrindex®) reagent as a source of thrombin.[13] Factor assays were obtained by adaptation of the method described by Hardisty and Macpherson.[14]

Case Reports

Case One

A 67-year-old male was first seen in 1970 with an eight-month history of easy bruising and a four-year history of rheumatoid arthritis. Pertinent laboratory data was as follows: erythrocyte sedimentation rate (ESR), 29 at 60 minutes; lupus erythematosus (LE), negative; rheumatoid arthritis (RA) factor, positive; direct Coombs, negative; and serum protein electrophoresis, unremarkable. Coagulation studies are summarized in *Table 1*. X-rays of the skull, hands, dorsal and lumbar spine revealed osseous atrophy, degenerative changes, joint subluxations, and periarticular erosions. The patient was placed on prednisone, 10 mg daily, and azathioprine (Imuran), 150 mg daily. Although the patient has continued to have easy bruising and occasional significant but not life-threatening bleeding, recalcification times performed on normal plasma and a mixture of normal plasma and patient plasma have shown a progressive decrease in the dilutional factor necessary to arrive at a recalcification time for the mixture equal to that for the normal plasma.

TABLE 1

CASE 1. SUMMARY OF COAGULATION STUDIES

Test	*Result*	
Prothrombin time	Patient 13.3	Control 12.9
Partial thromboplastin time	Patient 70	Control 41.5
1:1 mix		
at 0 min	Patient & Control 69	
at 60 min	Patient & Control 74	
Thrombin time	Patient 13.5	Control 12.7
Factor assay		
VIII	Less than 1%	
1:1 mix	Less than 5%	

Case Two

A 22-year-old female was seen in June 1971 with a history of three miscarriages over the previous five years (two of the pregnancies were accompanied by marked edema, hypertension, proteinuria, and arthritis), biologically false positive venereal disease laboratory results (VDRL) for six years, and an intermittently positive LE preparation for four years. There was no history of abnormal bleeding. Pertinent laboratory data was as follows: direct Coombs, 3+; ESR, 26 at 60 minutes; RA factor, negative; LE preparation, positive; β_1C globulin level, within normal limits; antinuclear antibody (ANA) titer, 1:10; VDRL, positive; quantitative urinary protein, approximately 3 gm/24 hours; and creatinine clearance, greater than 100 ml/minute. Protein electrophoresis was unremarkable. Coagulation studies are summarized in *Tables 2 & 3*. The patient was placed on 40 mg of prednisone daily for one month, after which time azathioprine, 100 mg daily, was added to the prednisone. In January 1972, the patient had a normal prothrombin time and partial thromboplastin time.

Case Three

A 22-year-old female was evaluated in July 1971 for a long history of easy bruising, questionable splenomegaly, and a four-month history of thrombocytopenia. Pertinent laboratory data was as follows: platelet count by manual method, 19,000/cu mm; direct Coombs, negative; LE preparation and RA factor, negative; and serum protein electrophoresis, normal. Bone marrow examination revealed normal numbers of megakaryocytes with many immature forms. Liver-spleen scan revealed no definite splenomegaly. Coagulation studies are summarized in *Table 3*. The patient was started on 30 mg of prednisone daily. In December 1971, the patient was readmitted for splenectomy with a platelet count of 8,000/cu mm and a partial thromboplastin time (PTT) essentially unchanged from July 1971. Following splenectomy, the patient's platelet count increased to 387,000/cu mm on the sixth postoperative day, and the PTT was only seven seconds over control on the second postoperative day. The patient was discharged on no medications. No further followup is available at this time.

TABLE 2

CASE 2. SUMMARY OF COAGULATION STUDIES

Test	*Result*	
Prothrombin time	Patient 12.5	Control 10.2
Partial thromboplastin time	Patient 50.2	Control 39.2
1:1 mix		
at 0 min	Patient & Control 43.7	
at 60 min	Patient & Control 50.0	
Factor assay		
VIII	127% of normal activity	
IX	100% of normal activity	
X	40% of normal activity	
1:1 mix		
0 min	50%	
60 min	43%	

TABLE 3

CASE 3. SUMMARY OF COAGULATION STUDIES

Test	*Result*	
Prothrombin time	Patient 11.8	Control 11.7
Partial thromboplastin time	Patient 58	Control 38.7
1:1 mix		
at 0 min	Patient & Control 45.8	
at 60 min	Patient & Control 49.6	
Thrombin time	Patient 11.8	Control 13.1
Factor assay		
VIII	125% of normal activity	
IX	Greater than 80%	
XI	Greater than 1% of normal activity	
XII	33%	
1:1 mix	41%	

Discussion

The occurrence of circulating anticoagulants has been noted in several disease states including congenital coagulation defects,[7, 15, 16] chronic infections,[4] chronic nephritis,[4] liver disease,[4, 23] dysproteinemias,[17–20, 22, 24] autoimmune diseases, dermatitis herpetiformis,[4] pemphigus,[4] rheumatic heart disease,[12] carcinoma,[4] and leukemia.[4, 25] A real association between many of these diseases and a circulating anticoagulant is not obvious and may be coincidental. However, increased awareness of circulating anticoagulants should result in an increase of their recognition which may statistically support a real relationship, or even reveal the mechanism underlying such a relationship. In addition to disease states, circulating anticoagulants have been noted in the postpartum state,[2, 27] following blood transfusions,[12] and in patients without any apparent disease or predisposing factor.[12]

The most abundant case reports refer to Factor VIII inhibitors, primarily occurring in congenital factor deficiency after repeated blood transfusions or antihemophilic globulin (AHG) therapy.[3, 12] However, the occurrence of a circulating anti-Factor VIII has been documented in the postpartum state,[2, 3, 12, 27] in abnormal immunologic states (lupus erythematosus, rheumatoid arthritis, drug reactions),[9, 12, 26, 28] in dysproteinemias,[18, 19, 24] in dermatologic conditions,[12] in infectious processes,[4] in inflammatory bowel disease,[12, 21] in rheumatic heart disease,[12] following blood transfusions,[12] and in apparently normal individuals.[3, 4, 12]

Much less commonly observed are circulating anticoagulants to Factors I, V, VII, IX, XI, XII, and XIII. Factor II deficiency and a possible anti-Factor II were reported in a 12-year-old female with lupus erythematosus.[29] Circulating inhibitors of Factor V have been noted in patients with congenital Factor V deficiency following transfusions.[30] Of interest is the documentation of an inhibitor of the reaction between Factors V and X, noted in some patients with lupus erythematosus.[4] Circulating anticoagulants directed against Factor IX have been observed almost exclusively in patients with congenital deficiency of Factor IX who have received numerous blood transfusions. On rare occasions, patients without congenital deficiency have acquired circulating inhibitors of Factor IX following transfusion.[5, 15] One case report documents an anti-Factor IX in a patient with systemic lupus erythematosus.[31] The presence of anti-Factor XI has also been reported in two patients with lupus erythematosus.[31]

The treatment for bleeding diathesis secondary to a circulating anticoagulant usually employs the combination of steroids and immunosuppressive agents, plus fresh whole blood, frozen plasma, or AHG.[12, 27, 31–36]

In summary, this paper has reported three cases in which circulating anticoagulants have been identified: anti-Factor VIII in a patient with rheumatoid arthritis; anti-Factor X in a patient with systemic lupus erythematosus; and anti-Factor XII in a patient with idiopathic thrombocytopenic purpura. These cases illustrate a portion of the spectrum of diseases in which circulating anticoagulants may be encountered, and they serve to report the rare occurrence of a circulating inhibitor of Factors X and XII.

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(Continued on page 490)

Clinical Correlations During Amphotericin B Therapy

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Amphotericin B, which was introduced for clinical trials in 1955, is a potent drug useful in the therapy of some mycoses.[1] It has no antibacterial effect, but under certain conditions exerts an antimycoplasma action. Carboxyl and amino groups make the molecule amphoteric, hence the name. It is characterized by a large macrolide ring containing a series of conjugated double bonds, therefore, it is a polyene compound. It is generally accepted that the pharmacologic activity of the drug alters the lipid arrangement in cytoplasmic membranes.[2] Toxicity to animal cells may be related to this action.

Most of the clinical effects of amphotericin B are predictable and respected. Chills, fever, anorexia, nausea, malaise, headache, and phlebitis are among the more common reactions. Toxicity, that may actually limit the rate or duration of therapy, can manifest itself as reduced renal function, and perhaps hypokalemia and anemia. The decreased caloric intake, negative nitrogen balance, preventable potassium depletion, and drastic decrease in urinary calcium have been reported by us previously.[3, 4]

Since there are few drugs available for most serious fungal infections, it is desirable to study further the clinical and pharmacologic effects of amphotericin B. This paper reports our study of the general responses to drug administration and its effects on the hematopoietic, adrenal, hepatic, and renal systems in particular.

Materials and Methods

Between 1967 and 1971, 15 patients treated with amphotericin B for systemic or deep fungal infections were studied before, during, and after drug administration. A brief description of these patients is shown in *Table I*. Thirteen were males; three patients were under 20, and the oldest was 66 years of age. There were five patients with histoplasmosis, and three with sporotrichosis and aspergillosis; cryptococcosis and coccidioidomycosis were each present in the two patients. One patient had blastomycosis.

Daily physical observations made routinely on these patients included recording vital signs, inspection of venous infusion sites, and a brief physical examination. The following laboratory tests were performed before, during (at weekly intervals), and after the end of amphotericin B therapy and three months later: complete blood count (CBC), erythrocyte sedimentation rate, platelets, BUN, serum creatinine, creatinine clearance, uric acid, serum electrolytes, serum iron, total iron binding capacity, urinalysis, serum glutamic oxaloacetic acid transaminase (SGOT), alkaline phosphatase, serum glutamic pyruvic transaminase (SGPT), and lactate dehydrogenase (LDH) with isoenzymes. In addition, CBC, urine analysis (UA), serum creatinine, and blood urea nitrogen were performed at least three times weekly in most patients.

Extensive medical evaluation including appropriate x-rays, electrocardiograms, and bone marrow examinations were performed before and after ampho-

TABLE I

AMPHOTERICIN B METABOLIC STUDY PATIENTS

Pt.	*Age*	*Sex*	*Infection*
VC	16	M	Histoplasmosis, Disseminated
LA	55	M	Histoplasmosis, Disseminated
LM	65	M	Histoplasmosis, Disseminated
GF	56	M	Histoplasmosis, Cavitary
CS	55	M	Histoplasmosis, Cavitary
LM	55	F	Sporotrichosis, Systemic
RW	33	M	Sporotrichosis, Systemic
TF	17	M	Sporotrichosis, Regional
HW	40	M	Cryptococcal Meningitis
BK	28	M	Cryptococcal Meningitis
EP	42	F	Cryptococcal Meningitis
RC	42	M	Aspergillus Brain Abscess
DS	10	F	Aspergillosis, Pulmonary
RA	42	M	Coccidioido, Disseminated
TB	66	M	Coccidioido, Disseminated
MD	52	M	Blastomycosis, Pulmonary

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tericin B therapy and at selected intervals during treatment. Similar time intervals were used in spacing determinations of urinary osmolality (after 14 hrs of water deprivation), and of urinary keto[5] and ketogenic[6] steroid excretion rates.

Drug therapy was initiated in each patient by administration of 1 mg in 3 to 4 hours. This was followed by daily rapid increase of the dosage to the maintenance level in 7 to 10 days. Tolerance of each patient to drug administration was established primarily according to the reduction in creatinine clearance during this early maintenance period. After the first three weeks of therapy, the drug was given at a relatively fixed dosage for each patient (up to 1 mg/kg/day) and careful monitoring was continued to preclude serious toxicity. All but one of the patients received 2 to 3 gr of amphotericin B over 43 to 136 days.

Results and Discussion

Fever, chills, nausea, vomiting, and headache occurred with the early infusions in most patients. We named the most dramatic of these immediate reactions observed, "the grey syndrome." The patient became ashen in color, acral cyanosis occurred, and a generalized feeling of prostration developed. This phenomenon was not dose-related, and its severity was less evident as therapy continued. It was not associated with tachycardia or hypotension, and resolved soon after discontinuation of the individual infusion. Immediate reactions occurred in every patient but with variable expression of severity. These were not obviously dose-related in that some of the most dramatic reactions occurred when the initial one milligram dose was given. In addition, there was no correlation between the severity of reaction and the severity of the patient's infection, and all reactions became less intense as therapy progressed.

Other generalized toxic effects such as myalgias, arthralgias and anorexia were chronic problems, not limited to the time of each infusion. Phlebitis appeared regularly in each of our patients, occurring to some degree with each injection. Rotation of the infusion site, application of hot packs, avoidance of unnecessary venapuncture, and the use of metal scalp vein infusion needles for a minimum duration reduced the severity of this problem.

The anemia produced by amphotericin B in these patients was generally normochromic normocytic. No consistent changes in iron metabolism could be demonstrated by determination of serum iron and total iron binding capacity. Hemolysis was present in only one patient and was not obviously drug related. Two patients had pancytopenia prior to therapy which resolved after treatment started. No other aberrations of the peripheral blood were detected.

Figure 1 shows data on the patients not anemic prior to amphotericin B therapy. The hematocrit level is shown on the vertical scale as measured at several periods on the horizontal scale. The dots in the first large box represent the time in weeks from starting the drug to the development of the lowest hematocrit. The interval from the lowest hematocrit in the first large box to the hematocrit at the end of therapy in the second large box is also recorded in weeks.

Nine patients had initial hematocrits of 39 per cent or above. The lowest hematocrit in seven of these patients occurred between the 5th and 10th weeks of therapy. In the other two, the lowest hematocrit occurred near the end of the third week. The hematocrit in each of them increased or at least stabilized as the drug was continued during the latter part of therapy, despite receiving a higher daily dosage. Eight of the nine patients showed hematocrit values near pretreatment levels three months after completion of therapy.

The six patients with anemia prior to amphotericin B showed a slightly different response pattern, as seen in *Figure 2*. The hematocrit in four of these patients dropped significantly during the first week of therapy. Two were given blood then. At the end of therapy, the hematocrits in all six of these patients closely approximated pretreatment levels. In five of the six, the hematocrit steadily rose during the last half of therapy, again, despite the fact these patients were receiving higher daily doses of amphotericin B. When examined three months later, two patients were still mildly anemic.

Figure 3 demonstrates the individual variability in hematologic tolerance. B.K. and H.W. were both ambulatory males with chronic cryptococcal meningitis, and both had normal hematocrits prior to thera-

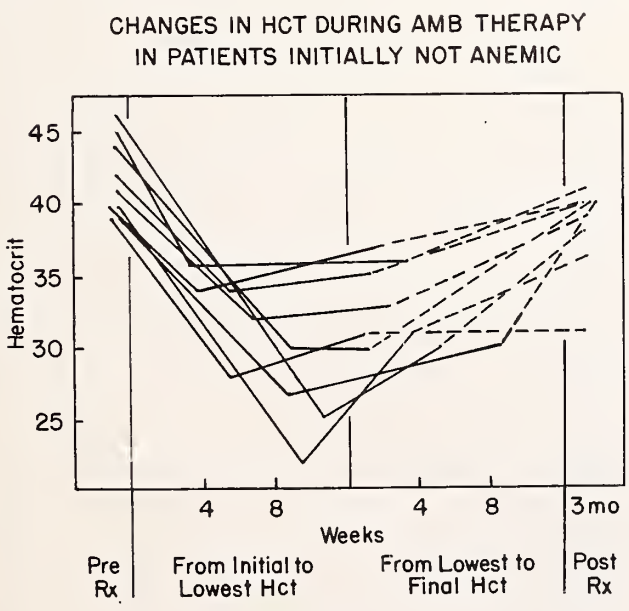

Figure 1

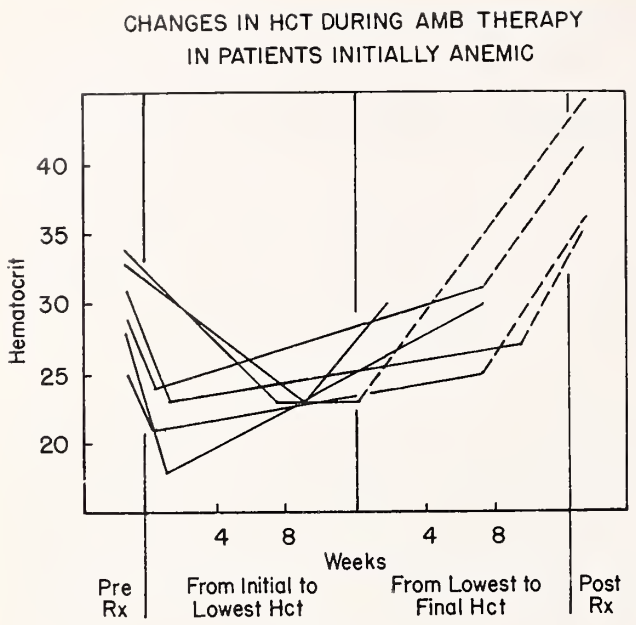

Figure 2

py. H.W.'s hematocrit droped to a low of 26 per cent ten weeks later. At the end of therapy, six weeks after the low point, and while he had received an increasing amount of drug, the hematocrit had risen to 30 per cent. Three months later, it was 37 per cent. In contrast, B.K. reached a low hematocrit of only 36 per cent and stabilized there, despite doses of 1 mg/kg/day, three times the dose per day given H.W. B.K., a 15-year-old boy with disseminated histoplasmosis whose initial hematocrit was 28 per cent, received 1 mg/kg/day during maintenance therapy and showed a steady rise in hematocrit level despite the fact that his initial hematocrit had dropped sharply during the first four days of therapy.

Weekly determinations of SGOT, SGPT, LDH and isoenzymes, alkaline phosphatase, and bilirubin

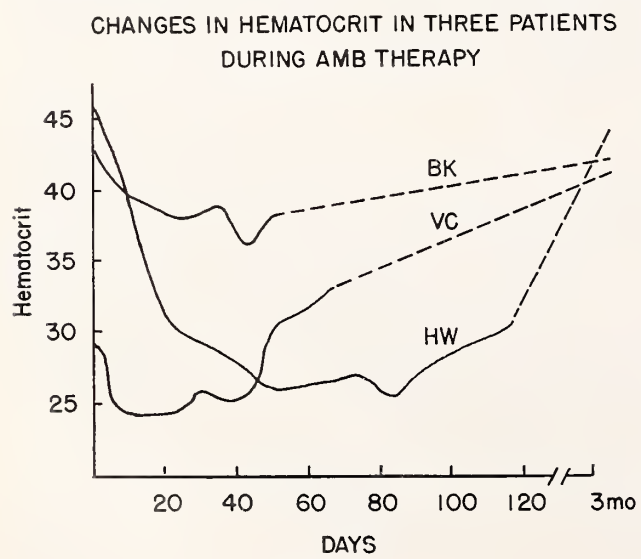

Figure 3

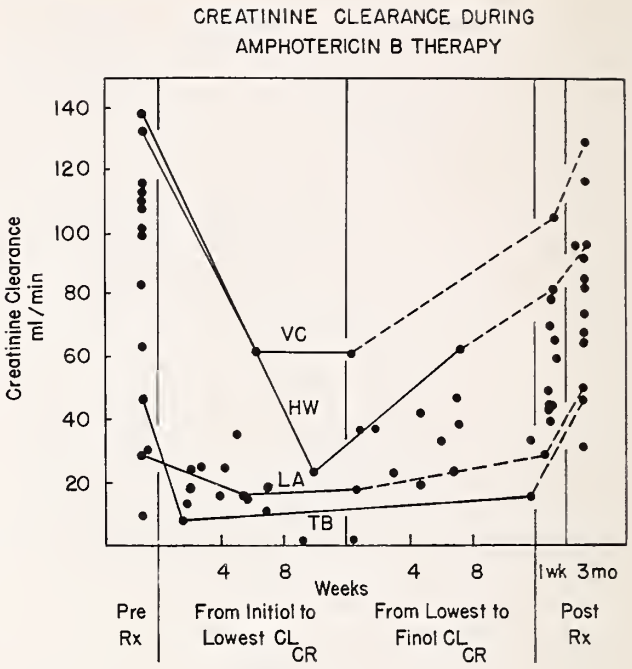

Figure 4

failed to show any evidence of hepatic toxicity. In those patients whose liver enzymes were elevated prior to treatment, the administration of amphotericin B was associated with a return to normal levels.

Figure 4 shows the changes in creatinine clearance associated with the drug. The range of clearance prior to therapy shown on the vertical axis was from 10 to 140 ml/min. All 15 patients dropped from their initial levels, and the lowest clearance (shown in the first large box) was reached in all but one patient between three and seven weeks after starting treatment. Strikingly, 13 patients showed rising creatinine clearances the latter part of therapy (shown in the second large box). Eleven of 12 patients had significant rises of creatinine clearance one week after treatment; however, only seven of 13 had achieved clearance levels equal to or greater than those prior to treatment at three months followup. Three of the four patients with initial azotemia had recovered to at least their initial clearances by that time.

Figure 4 also illustrates individual variability in clearance patterns. The line V.C. represents the course of the creatinine clearance of a patient who received 1 mg/kg/day, yet his lowest clearance was 62 ml/min at the end of six weeks. Therapy was completed several days later and substantial recovery of clearance was demonstrated within one week. Despite a low maintenance dosage for H.W., less than one-third of the dose given V.C., a low clearance of 25 ml/min was reached ten weeks after starting the drug. He showed a steady rise during the last eight weeks even though dosage was in-

creased; and early improvement occurred upon cessation of the drug.

L.A. and T.B. had mild pretreatment azotemia. T.B., a patient with systemic coccidioidomycosis began and finished therapy with a clearance of about 45 ml/min, although an early drop was seen. L.A., who had systemic histoplasmosis, nearly doubled his clearance from the pretreatment value three months post-therapy.

Figure 5 illustrates the drug effect on the renal concentrating ability. There was a dramatic drop in those osmolalities obtained after water deprivation during the first few days of treatment and prior to reaching continual high dosage maintenance therapy. The rate of post-drug recovery was slower than for clearance, although at the three-months followup it appears to be about as complete.

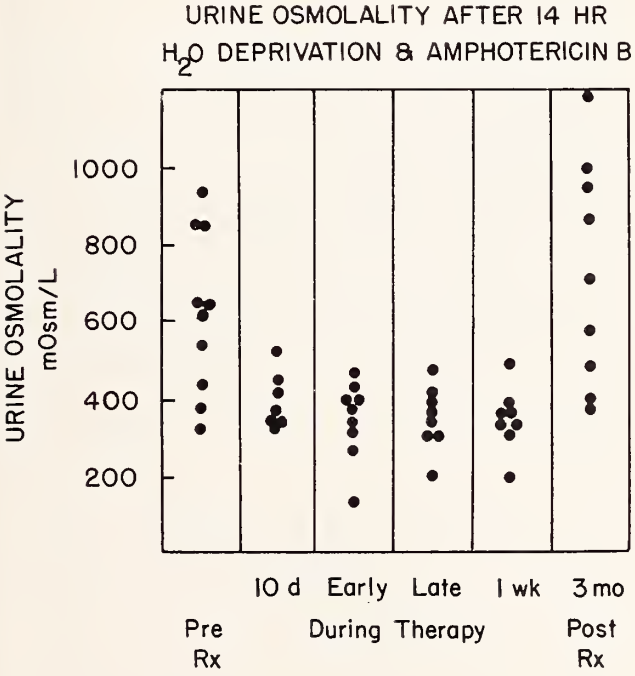

Figure 5

The BUN is particularly inadequate as an indicator of renal clearance in patients receiving amphotericin B.[7] An example of its unreliability in our patients is shown in *Figure 6*. The BUN is shown as ascending values on the vertical scale on the left, while the clearance of creatinine is depicted in descending values on the vertical scale on the right. The times of the observations are shown on the horizontal scale.

Note that between days 15 and 30, when R.W.'s clearance dropped from 35 to 20 ml/min, his BUN declined from 41 to 20 mg per cent. Later, between days 45 and 60, the BUN rose to 30 mg per cent, while the creatinine clearance was actually rising to 38 ml/min. Finally, note that the BUN in the post-treatment period when creatinine clearance is 84

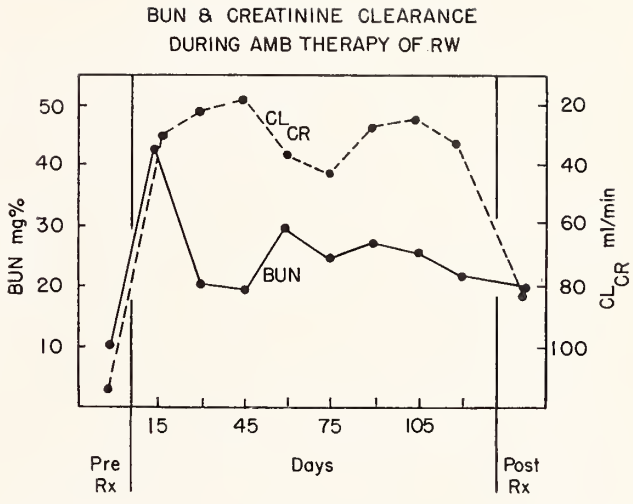

Figure 6

ml/min is at the same level as when the clearance was only 20 ml/min.

Figure 7 represents the changes in ketogenic steroid excretion after one day of adrenocorticotrophic hormone (ACTH) stimulation. Treatment and post-treatment values are expressed as percentage change from pretreatment stimulation levels. Therefore, each patient serves as his own control. A reduction in ketogenic steroid excretion occurred during the administration of amphotericin B in each patient. Three months after therapy was discontinued, the adrenal responsiveness returned to pretreatment levels. Additional data utilizing three consecutive days of ACTH stimulation indicated that the rate of maximal adrenal response, as well as its magnitude, is effected.

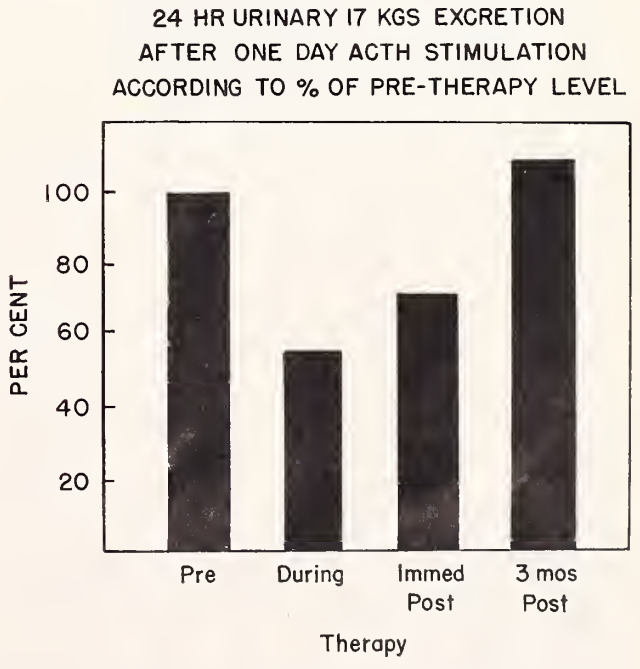

Figure 7

Summary

The information accumulated from these studies makes several conclusions possible. Symptoms with therapy were many and varied greatly from patient to patient; but tolerance developed to the immediate and chronic toxic effects of the drug. Anemia, a regular occurrence, was not dose-related in severity or time of onset and did not limit therapy. Transfusion was required rarely. No abnormalities of white cells, platelets, or liver function were detected. Decreased creatinine clearance and renal concentrating ability were expected, but serious difficulties were avoided by modification of the dosage according to clearance function. Despite information in the drug brochure, the BUN is not a reliable guide for drug use. Reduction in adrenal responsiveness occurred in all patients during therapy; this may not be clinically important unless there is borderline function initially. Tolerance for drug toxicity developed but it was different for each patient. The severity of toxicity and the degree of tolerance can be estimated only grossly prior to treatment. Hopefully, this information will permit more effective and less deleterious therapy with this potent drug.

TABLE II
SUMMARY

1. Reactions occurred during each infusion, but diminished with repeated infusions.
2. Chronic reactions were experienced during the entire course of therapy, not related to each infusion.
3. Anemia, usually normochromic, normocytic, was a regular occurrence.
4. Nephrotoxicity limited the amount of therapy, but the BUN was not a good indicator.
5. Adrenal function was reduced.
6. "Tolerance" developed even as dosage was increased.

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Acquired Circulating Anticoagulants

(Continued from page 485)

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House of Delegates Meeting
November 19, 1972
See Page 493

The President's Message

DEAR DOCTOR:

The other day, one of my partners took me to task. "Ken," he said, "you are trying to make all doctors in the state act as though they trusted each other. They don't. There is no way to make all doctors cooperate to the point that they will all actively support their medical society."

He continued to point out that physicians must be artistic, individualistic, and strong willed (his term was pig headed). He thinks this precludes any hope of unified, strongly supported action by our medical society or, for that matter, by any grouping of physicians.

He may be right; but hope springs eternal in the human breast, and those of us who work for medicine are deplorable idealists.

The pity of his philosophy is that I hear it most often from men who are angry and despondent; frustrated men who bitterly voice a sense of impending doom.

There is time yet.

We must all band together, and work out a program for the defense of medicine.

Kenneth L. Graham M.D.

President

Editorial COMMENT

The Successful Failure

The place of the physician in the political world is not an easy one to define. The relationship of the physician to his fellowmen has been primarily a personal one which does not translate easily into terms of socio-political effect. As physicians have merged into an ofttimes tumultuous group, their place and function have been perplexing to the political world as well as their own. Medical care is one of man's oldest efforts and it is at least strange that only now a more sharply defined role in the political world is emerging.

Several months ago, in *Horizon,* J. B. Blount posed the thesis that we are in the midst of a social revolution unequalled since the establishment of the agrarian culture. He presented a scholarly and convincing case, but what interested us was that nowhere in his essay was there mention of medicine in the development of the present situation or as an influence on the future. Robert Hudson, in his Hertzler Memorial Lecture of last year and published here in April 1972, ponders the failure of historians to consider the forces of disease and the counterforces of healing in shaping man's progress. There are medical histories oriented to this professional discipline, and intermittently the history books have recorded the illness or injury of some key figure, or in passing noted the effect of some epidemic, but usually only as an interesting footnote. Medical rituals of earlier times are recorded, but only as observations of life in those times, not because of their impact on today. Religious controversy has been a prime factor in the course of man's history and duly included in its records, but were his diseases and injuries and emotional upheavals so separable as to be almost ignored?

Although medical function has failed to create a more visible impact on the historical record, it has achieved a state of progress which can best be defined as a continuity of the success-failure phenomenon. The predestined expression of medicine's failure, death, is axiomatic. We have crept slowly toward the implied goal of immortality by extending the life span a few additional rotations of the earth, but this success still leads to failure.

The medical world has faced countless challenges and scotched many of them. Infectious diseases are a favorite example. But the success with these is tempered by the fact that there are still others to be contended with, that the offending organisms all too often display a cunning ability to regroup and renew the attack, that medicine's therapies may become, in themselves, assaults on the human organism. Dramatic surgical techniques win the battle of the day and set the scene for a different battle tomorrow. Although the physician's efforts have been primarily oriented toward the individual patient, his public health efforts have produced some fantastic effects. Long before it was the "in" thing, environmental control (sanitation, if you will) was changing the course of history. The common element in all of these is that the successes led to "failures" in the form of new problems.

If we are in the midst of such a social revolution, and we believe we are, the physician must of necessity became a social innovator; not only within his profession, but in the total social structure as well. The socio-politicists are hard at work attempting to define, measure, and package the medical effort on the basis that it must be subservient to the socio-political structure within which it exists. This is not an entirely new experience for the physician, but never has the pressure been so overt, and it is taking some effort for him to readjust his focus from the individual to the group. It is no service to the individual, the group, or the physician to deny that any change is in order. It is insufficient to presume that we are looking through a zoom lens which will automatically readjust its focus to accommodate the visual acuity of our profession alone. We cannot exorcise the failure to meet a new social situation we helped to make by pointing to past successes because, in the constantly changing scene, successes are easily forgotten in the face of new failures.

We hear today that health care is one of those basic essentials which must be assured to all. If this is true today, it has always been true; but before this, health care has been so intimately incorporated into the fabric of the times that its influence has not been recorded as have the wars, explorations, royal fe-

cundity, personal ambitions, crop failures, trade conferences, and all the other items that have claimed the interest of historians. But today, the physician is visible as never before and if his fellowmen expect him to solve their social ills, it is because he has a good record of success in what he has been doing. Offhand, we'd say he is as well equipped as many, and better than most. At least, he must make himself heard.—*D.E.G.*

(The following communication regarding an outbreak of mumps was received from Dr. Ronald D. Greenwood, M.D., Salina, Kansas. It is here presented not only to recognize Dr. Greenwood's work, but to encourage others to submit similar reports.—Ed.)

MUMPS OUTBREAK IN A SMALL COMMUNITY

Schilling Manor is an army post which is essentially an isolated community that lends itself to an epidemiological study. A recent outbreak of mumps revealed some interesting facts.

During the period of mumps outbreak (April-July 1972) there were 1,475 children in residence. Of these, 708 (48%) were susceptible to mumps; that is, they had not previously received mumps vaccination or had clinical mumps parotitis. During the period of "epidemic," 76 children (11% of susceptibles) and 2 adults acquired clinical mumps parotitis. Five of these children (6.5% of cases) had documented mumps meningoencephalitis and required hospitalization. One of the two adults experienced mumps orchitis.

A few children developed mumps in April; these were the index cases for whom no source of infection could be ascertained. The number of cases reached a peak in mid-June, and by the first of August the last cases had been seen. The outbreak could be divided into original cases and six successive waves of cases.

All inhabitants live in three adjacent housing areas and all public facilities are frequented by all occupants. From tracing movement of occupants, it was noted that all base facilities and social functions during the time of the outbreak were "contaminated" with children in their most infectious stages. The heavy exposure was from children at nurseries, day camp, and swimming pool the two days before onset of swelling. Therefore, there was almost total exposure despite isolation procedures at the time of diagnosis.

There were only 89 children between the ages of 10 and 14 years who had not had direct contact with children with mumps. These children were then vaccinated with live attenuated mumps vaccine. Two of these experienced mild transient parotid tenderness; otherwise no ill effects were noted.

Mumps is a highly contagious disease; yet, it is of note that only 11 percent of "susceptibles" experienced clinical parotitis despite conditions where all were exposed. Most cases were traced to fairly intense rather than random exposures. It is unknown how many children received previous subclinical exposure and are not susceptible in any such outbreak.

The Fall Meeting

of the

HOUSE OF DELEGATES

Sunday, November 19, 1972–10:00 A.M.

HOLIDAY INN–Skyline Room
Lawrence, Kansas

One day business meeting to consider items relating to legislation and others that cannot be delayed until May. It is hoped all component societies will be represented by their full complement of delegates.

All members of the Society are invited.

Personalities—IN KANSAS MEDICINE

Two Arkansas City physicians, **J. E. Hill** and **R. F. Morton,** were appointed to the State Board of Healing Arts by Governor Docking. The Governor appointed **R. O. Nelson,** Lawrence, to the State Board of Health.

R. R. Brummett, Neodesha, attended an Aviation Medical Examiners seminar at Arlington Heights, Illinois, recently. **W. J. Collier,** McPherson, attended the annual meeting of the Flying Physicians Association in Pine Mountain, Georgia.

A new physician has joined the Olathe community. He is **J. O. Soeldner.**

W. J. VonRuden, Hutchinson, was elected president of the Kansas Heart Association during the association's recent annual meeting. **D. D. Decker,** Halstead, past president, was a panelist on the program.

R. G. Heasty, Manhattan, discussed therapeutic abortions at the city's Rotary Club meeting recently.

Honored for his 50 years of practicing medicine and now retiring was **J. R. Nevitt,** Moran.

J. D. Huff, Kansas City, is the new president of the Kansas Academy of Family Physicians.

Speaking at separate meetings conducted by the Arthritis Foundation were **E. V. Carlson,** Hays; **M. D. Atwood,** Kinsley; and **J. A. Lynch,** Topeka.

G. C. Hutchinson, Hays, and **J. M. Holt,** Great Bend, attended regional tuberculosis clinics where they discussed "Tuberculosis Care for the Seventies."

Joining the medical practice ranks in Hays is **H. A. Wiegman,** who completed his residency requirements in radiology.

C. C. Conard and **C. F. McElhinny,** Dodge City, conducted a public seminar on the topic of ulcers.

After practicing medicine for 45 years, **C. M. Benage,** Pittsburg, a former KMS president, is retiring to devote more time to the field of mental health care.

V. M. Eddy, Hays, discussed the topic of hyperalimentation at a recent meeting of the Kansas State Nurses Association.

J. R. Sumner, Hutchinson, has been re-elected Assistant Secretary of the American Society of Anesthesiologists.

Council Meeting

Report of Meeting Held September 24, 1972

The Council was called into session at 10:00 a.m. on Sunday, September 24, 1972 at the Downtown Topeka Ramada Inn. Dr. Kenneth L. Graham, President, called the Council to order.

Present were Dr. K. L. Graham, President; Drs. T. P. Butcher, P. A. Godwin, C. M. Lessenden, Jr., J. C. Mitchell, L. R. Pyle, T. F. Taylor, and J. W. Travis.

The following Councilors were present: Drs. W. O. Wallace, District 1; D. J. Smith, District 3; Gerald Mowry, District 5; R. R. Beach, District 6; E. G. Campbell, District 7; S. S. Daehnke, District 8; K. G. Wedel, District 9; R. M. Glover, District 10; W. E. Meyer, District 11; V. W. Filley, District 12; E. T. Siler, District 13; W. E. McAllaster, District 14; H. W. Hiesterman, District 16; G. W. Fields, District 17; and A. C. Mitchell, District 18.

Also present were Drs. C. V. Black, Pratt; F. T. Collins, Topeka; J. C. Dowell, Salina; H. T. Gray, Wichita; E. C. Hwa, Newton; J. B. Jarrott, Hutchinson; M. R. Knapp, Wichita; J. E. Lungstrum, Salina; J. N. Nelson, Topeka; D. R. Pierce, Topeka; W. O. Rieke, Kansas City; W. R. Roy, Washington, D. C.; C. R. Svoboda, Chapman; and E. D. Yoder, Denton.

Also present were Mrs. Martha Hunt, Mr. Hank Parkinson, Mr. Jim Agin, and Mr. Oliver E. Ebel.

The minutes of the May 7, 1972 meeting of the Council were approved.

The Treasurer's Report, presented by Dr. Lessenden, was reviewed and the 1973 budget was approved.

Dr. Rieke, Vice Chancellor of Health Affairs at KUMC, made an extensive report on the progress of KUMC expansion. It is expected that the Family Practice Program at Wichita will be operational shortly and that 12 students will actually be taking training in Wichita by next July. It is expected that all major specialties will be involved.

Dr. Rieke further elaborated that the intern and residency programs at Topeka are being finalized. There is a surgical residency already in operation in Garden City. The principal problem in establishing these programs is the required manpower.

Both the number of students and faculty has increased. Physical expansion of the school is also growing. It is estimated that 250 new beds will be added, to bring total capacity to 787.

Next, Dr. Roy presented a report concerning legislation being enacted in the Congress.

It was announced that the Executive Committee had been studying the question of whether evidence of graduate education should be required for license renewal. The Council instructed the Executive Committee to study this subject further and to report to the House of Delegates next May.

Some concern was expressed regarding lack of active participation on the part of individual physicians in the affairs of organized medicine. An opinion was expressed that Councilors should exert a more vigorous effort to get the members involved, and as a step in that direction, the Councilors should regularly write letters to the members in their districts.

On the subject of election of the Councilors, the following motion was adopted:

> *Resolved,* That the Bylaws be amended in Section 8.11 relating to the election of Councilors by deleting from the second-to-the-last sentence of the section the words, "at the Annual Session of the Society."

It was believed that this change would enable a more orderly election of the Councilors with nominations from the component societies in the district.

It was next determined that the fall meeting of the House of Delegates will be held on Sunday, November 19, 1972 in Lawrence.

Upon invitation from Dr. Jack Walker, Mayor of Overland Park, and from the Johnson County Medical Society, the Council voted to hold the 1975 Annual Session at the Glenwood Manor Motel in Overland Park, Sunday through Wednesday, May 4-7, 1975.

Broadview Hotel in Wichita was declared the official headquarters for the 1973 Annual Session.

A request from the national SAMA office was received for aiding the convention expenses of Kansas delegates to the Cincinnati meeting. No request had been received from Kansas. Dr. Smith volunteered to investigate whether the Kansas SAMA Chapter was interested in sending a delegate, in which case the Society would make a contribution toward defraying the expenses.

Dr. Knapp was duly elected to serve as chairman of the Nominating Committee for 1973.

Dr. Campbell reported on two problems in his district concerning the payment of delinquent dues. The Council decided to refer this matter to the House of Delegates, with the recommendation that the physicians in question be reinstated to membership upon payment of their delinquent KMS dues.

(Continued on page 496)

Woman's Auxiliary

. . . *Annie gets back to the bus*

"It's what you do with what you got" that counts. That's what old Uncle Remus said, anyhow. And your Auxiliary Annies have made the proverbial silk purse out of the sow's ear in their Health Careers Bus.

Honest, you should see that thing. You'd never know it was the old State Board of Health x-ray unit if you didn't look at her pug-nosed snout. She (since it's called HER for Health Education Resources, I guess it's a she) has really blossomed out in her new clothes. Outside she's painted a light canary yellow, with avocado, orange, and turquoise letters that say this. Other big bold black letters say that she is the Woman's Auxiliary to the Kansas Medical Society Health Careers Bus. It makes us right proud.

Inside, the gold carpet complements the paneled walls with their green, white, and orange panels that are the display backgrounds. Oh, she's a colorful little gal, HER is.

Mrs. Warren Meyer, Wichita, our bus advisor, and her sidekick, Mrs. J. R. Stark, health careers chairman, are the people to contact about the bus if you have questions, or if you wish to book it and you have no local Auxiliary to do it for you. Ordinarily, booking should be made through local Auxiliaries who have all the instructions on use of the bus. If you should need to, you could call or write the Halstead Health Museum to ask about booking, as they are handling the routing for us. They are also the nice people who did all the renovation of the van, fast-talking and cajoling Halstead people into donating much of the material and time that was necessary. We are making an effort to keep the bus on some kind of a planned route, taking it from one city to the next city nearest, if at all possible.

The displays on the bus are mostly photographs, with posters or explanation lettering. This is because it is almost impossible to set up three-dimentional displays in such a small space. Besides, they tell us the kids will take anything with them that isn't nailed down. So we nailed them down with clear plastic fronts. Makes it easy to keep clean and all that, too.

Packets of information will be available to counselors or teachers for those students who are interested in a career. Each organization or profession on display will try to have a list of scholarships available for their particular specialty, with information about courses required in order to enter training, costs, time spent in training, and where training is available. These allied people will also assist the Auxiliary as hosts in the various towns, as a host or hostess must be on the bus whenever it's open to the public.

Displays have been assembled by the following people: the three state universities, the Kansas Academy of Family Physicians, the Kansas Nursing Association, the state Medical Technicians, Medical Assistants, Radiologists, Physiotherapists, the Kansas State Board of Health, and the Halstead Health Museum. The Auxiliary has a small space too.

We plan to take the bus to the state Auxiliary regional workshops in Norton, Sabetha, Halstead, Great Bend, and Lawrence during October and early November, so that county members can get a look at it and plan how they want to use it. After that, it's going to be on the road and we hope that it will recruit all the people you need to help you. We realize it will be several years before there'll be any noticeable increase in the help that's available to you, but it's better to start now than never.

So, once again, the Auxiliary would like to thank you . . . the members of the Medical Society . . . for financing this bus for us. Without you it would not have been possible.

Well, Annie has to take off for the tall building country and go to the national fall conference in Chicago. If she doesn't get lost on the loop or stuck in an elevator, she'll tell you all about it next time. At least, there aren't any cable cars for her to fall off of, which is probably a blessing.

Until then, be thinking how you would like your home Auxiliary to use our HER van. (Could one call the bus Mrs. Information or Ms. Information??? Anything but Miss Information . . .)

Urge your county Auxiliary to book the bus, will you? Here's to the Queen of the Road: HER.

Your'n, *Auxiliary Annie*

Council Meeting

(Continued from page 495)

The annual dues of $150 to the Kansas Association of Commerce and Industry were approved.

The next item for discussion concerned the Blue Ribbon Committee report dealing with Kansas Blue Shield. It was finally decided that this subject be presented to the House of Delegates.

The Council voted to contribute $500 to the KaMPAC Educational Fund.

The matter of a formula for paying Kansas representatives who attend AMA meetings was referred to the Executive Committee for further study and decision.

Charters of the Elk and Osborne County Medical Societies have been revoked by this Council. It was explained that the physicians in those counties belong to other component societies.

It was announced that the Clay County Hospital has been accredited by the Joint Commission of Accreditation of Hospitals.

THE Journal OF THE Kansas Medical Society

DECEMBER
1972

VOL. LXXIII
NO. XII

Everybody experiences psychic tension.

Most people can handle this tension.

Some people develop excessive psychic tension and need your counselin

and a few may need counseling
and the psychotropic action of Valium® (diazepam).

Before deciding to make Valium (diazepam) part of your treatment plan, check on whether or not the patient is presently taking drugs and, if so, what his response has been. Along with the medical and social history, this information can help you determine initial dosage, the possibility of side effects and the ultimate prospects of success or failure.

While Valium can be a most helpful adjunct to your counseling, it should be prescribed only as long as excessive psychic tension persists and should be discontinued when you decide it has accomplished its therapeutic task. In general, when dosage guidelines are followed, Valium is well tolerated (see Dosage). For convenience it is available in 2-mg, 5-mg and 10-mg tablets.

Drowsiness, fatigue and ataxia have been the most commonly reported side effects.

Until response is determined, patients receiving Valium should be cautioned against engaging in hazardous occupations requiring complete mental alertness, such as driving or operating machinery.

ROCHE
Roche Laboratories
Division of Hoffmann-La Roche Inc.
Nutley, N.J. 07110

Before prescribing, please consult complete product information, a summary of which follows:

Indications: Tension and anxiety states; somatic complaints which are concomitants of emotional factors; psychoneurotic states manifested by tension, anxiety, apprehension, fatigue, depressive symptoms or agitation; symptomatic relief of acute agitation, tremor, delirium tremens and hallucinosis due to acute alcohol withdrawal; adjunctively in skeletal muscle spasm due to reflex spasm to local pathology, spasticity caused by upper motor neuron disorders, athetosis, stiff-man syndrome, convulsive disorders (not for sole therapy).

Contraindicated: Known hypersensitivity to the drug. Children under 6 months of age. Acute narrow angle glaucoma; may be used in patients with open angle glaucoma who are receiving appropriate therapy.

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Precautions: If combined with other psychotropics or anticonvulsants, consider carefully pharmacology of agents employed; drugs such as phenothiazines, narcotics, barbiturates, MAO inhibitors and other antidepressants may potentiate its action. Usual precautions indicated in patients severely depressed, or with latent depression, or with suicidal tendencies. Observe usual precautions in impaired renal or hepatic function. Limit dosage to smallest effective amount in elderly and debilitated to preclude ataxia or oversedation.

Side Effects: Drowsiness, confusion, diplopia, hypotension, changes in libido, nausea, fatigue, depression, dysarthria, jaundice, skin rash, ataxia, constipation, headache, incontinence, changes in salivation, slurred speech, tremor, vertigo, urinary retention, blurred vision. Paradoxical reactions such as acute hyperexcited states, anxiety, hallucinations, increased muscle spasticity, insomnia, rage, sleep disturbances, stimulation have been reported; should these occur, discontinue drug. Isolated reports of neutropenia, jaundice; periodic blood counts and liver function tests advisable during long-term therapy.

Dosage: Individualize for maximum beneficial effect. *Adults:* Tension, anxiety and psychoneurotic states, 2 to 10 mg b.i.d. to q.i.d.; alcoholism, 10 mg t.i.d. or q.i.d. in first 24 hours, then 5 mg t.i.d. or q.i.d. as needed; adjunctively in skeletal muscle spasm, 2 to 10 mg t.i.d. or q.i.d.; adjunctively in convulsive disorders, 2 to 10 mg b.i.d. to q.i.d. *Geriatric or debilitated patients:* 2 to 2½ mg, 1 or 2 times daily initially, increasing as needed and tolerated. (See Precautions.) *Children:* 1 to 2½ mg t.i.d. or q.i.d. initially, increasing as needed and tolerated (not for use under 6 months).

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Volume LXXIII, Number 12—December, 1972

The JOURNAL of the KANSAS MEDICAL SOCIETY

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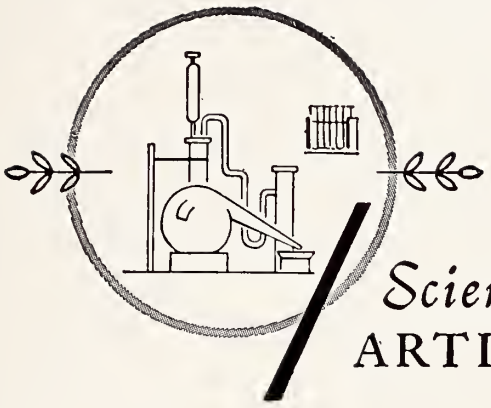

Scientific ARTICLES

Occult Melanoma

Metastases to the Small Intestine

JERRY D. SPENCER, M.D., ***San Diego, California and***
HOWARD P. FINK, M.D., ***Kansas City, Missouri***

MALIGNANT MELANOMA is well known for its ability to metastasize widely. Also, it is not unusual for isolated metastases from a melanoma to outgrow their primary. An example of this is a metastasis to the brain, in which neurological symptoms may be present before the patient or the physician discover a melanotic skin lesion. In fact, some melanomas are not diagnosed until the patient comes to autopsy, when the metastatic melanoma is found.

Another area in which focal occult metastases may occur is in the small intestine. Melanoma is probably the most frequent metastatic neoplasm of the small intestine.[1] Here it may cause symptoms related to hemorrhage, obstruction, or perforation. The diagnosis may be missed because the primary lesion is overlooked by the physician, may have regressed, or may have been removed and then forgotten by the patient. Some aspects of the diagnostic puzzle created by melanoma metastasizing to the small intestine are illustrated by the following two cases.

Case One

A 35-year-old white male was admitted to the medical service following a six-months history of anorexia, intermittent abdominal pain, and a 25-pound weight loss. Marital difficulties had developed nine months prior to admission and he attributed his illness to a nervous stomach.

Physical examination on admission showed a short cachetic male in mild distress from abdominal pain and weakness. Admission weight was 38.5 kg (85 lb). He was 180 cm (5 ft) tall. The abdomen was moderately protuberant and had a doughy consistency on palpation. Masses could not be palpated with certainty. No abnormal skin lesions were observed and the remainder of the physical examination was unremarkable. Laboratory examinations were unremarkable except for anemia (hemoglobin, 10.2 gm per cent; hematocrit, 33%), and three positive (3+) hematest specimens for occult blood in the stool. Bone marrow aspiration showed hyperplasia of all marrow elements. Sigmoidoscopy was negative to 25 cm. An upper gastrointestinal series *(Figure 1)* showed a massively dilated loop of jejunum distal to a large intraluminal mass. A suggestion of a second mass was seen at the distal end of the dilated bowel segment. The radiologist's interpretation was lymphosarcoma of the small intestine. The patient was transferred to the surgery service for exploratory laparotomy. The preoperative and postoperative diagnoses were small intestinal obstruction secondary to lymphosarcoma of the intestine. A 130 cm segment of small intestine was resected and an end-to-end anastomosis performed. The specimen *(Figure 2)* contained proximal and distal polypoid, pale yellow and ulcerated intraluminal masses measuring 5.0 and 9.0 cm in diameter respectively. Each lesion was attached by a 2 cm diameter stalk to the mucosal surface of the intestine. The distal mass (located 20 cm from the proxi-

Figure 1. Photograph of segment of upper gastrointestinal series demonstrating massively dilated loop of jejunum and the proximal intraluminal mass.

mal mass) served as the intussusceptum of an intussusception of the jejunum. Microscopically, the proximal tumor consisted principally of spindle shaped cells in a sarcomatoid pattern, and the distal one of compact and alveolar nests of polygonal epithelioid cells. The cells in both lesions contained large nucleoli and both histologic patterns were considered

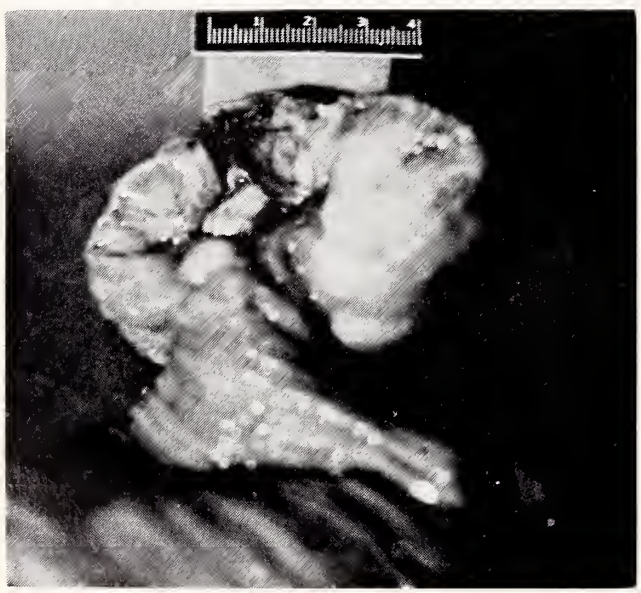

Figure 2. Photograph of proximal intraluminal mass showing polypoid lesion attached to the mucosal surface of the jejunum.

compatible with malignant melanoma. A few cells in each lesion contained cytoplasmic granules which were positive with Schmorl's stain for melanin or premelanin. Only 3 of 38 mesenteric lymph nodes were involved by melanoma.

Postoperative followup examinations by ENT, ophthalmology, and gastroenterology consultants were negative for a primary lesion. However, the patient did disclose to one consultant that he had had two dark moles on his right arm and back that had fallen off spontaneously in the preceding two years. Biopsy of the sites of these moles was planned on a clinic visit one month following the operation. However, the patient failed to keep the appointment.

Case Two

A 34-year-old white male presented with a chief complaint of recurrent small bowel tumor. He had been transferred from another hospital after having suffered left flank and left lower quadrant pain for three months. He denied nausea, vomiting, tarry stool, or diarrhea. Eighteen months previously, he had undergone a small bowel resection at another hospital. The hospital records for that admission revealed that he had initially been evaluated for anemia. An abdominal mass had been palpated and he was surgically explored. A neoplasm eroding into the lumen of the jejunum was resected and the tissue diagnosis was reticulum cell sarcoma. Prior to this admission, he had been on a regimen of cyclophosphamide (Cytoxan) and vincristine.

Physical examination on this admission was unremarkable except for tenderness and a palpable mass in the left lower quadrant. Laboratory examinations were unremarkable. An upper gastrointestinal series had demonstrated an extraluminal mass. A preoperative diagnosis of recurrent reticulum cell sarcoma of the small intestine was made. A mass measuring 8.0 × 7.5 × 4.0 cm was found at surgical exploration to occupy the bowel wall and was extending into the lumen. Obstruction of the intestine was not present. A second mass, measuring 6.0 × 6.5 × 4.5 cm, was found in the retroperitoneal space. The resected lesions were creamy white and grossly homogeneous except for focal hemorrhages. Microscopically they consisted of nests of rounded or polygonal malignant cells, a few of which were Schmorl positive *(Figure 3)*.

Further questioning of the patient elicited the information that three years previously he had a pigmented skin lesion excised from his right arm at another hospital, and had been told that it was malignant. Later investigation showed that the original tissue diagnosis of this skin tumor was malignant melanoma. A review of the microscopic sections confirmed the diagnosis. This melanoma was of an un-

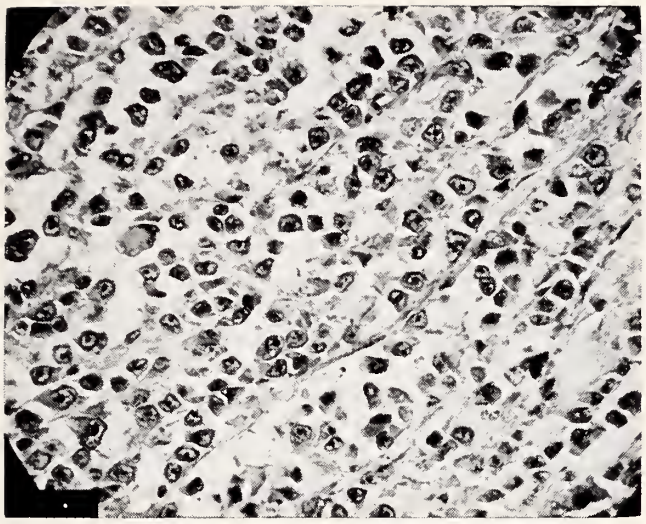

Figure 3A

Figure 3B

Photomicrographs of melanoma metastatic to the small intestine. A. In this area, the neoplasm has a trabecular pattern. The cells have scant cytoplasm, large nuclei and prominent nucleoli. A neoplastic, multinucleated giant cell appears to the left of the center of this field. B. A Schmorl's stain displays material positive for melanin or premelanin in this neoplasm.

usual type, namely a blue nevus with local epithelioid malignant change. Sections of the first bowel tumor were also obtained and reviewed. They resembled the lesion removed at this admission and, likewise, contained scant Schmorl positive material.

Discussion

In both of the above cases a diagnosis of metastatic melanoma was overlooked. The first patient was carefully examined preoperatively for skin lesions. He denied that he had had pigmented lesions or moles removed surgically. The fact that the wrong question was being asked was demonstrated postoperatively, when the patient disclosed that some moles had fallen off. Unfortunately, the patient was not available for followup, and the source for his metastatic melanoma must remain obscure.

In the second case, the primary lesion was not strictly occult because there was a history of removal of a melanoma. The information concerning the initial skin lesion was not obtained prior to surgery. The records identifying the small bowel tumor at this admission as a reticulum cell sarcoma, prompted an incorrect preoperative diagnosis. Only after the surgical specimen was evaluated, and the slides of the skin neoplasm and the first bowel resection were reviewed, was the proper diagnosis made.

In both of these cases, and in many similar cases, a source of diagnostic error is the tendency of some metastases from malignant melanomas to be nonpigmented. Such amelanotic lesions, in the absence of a present or previous primary, may be a difficult diagnosis for both surgeons and pathologists. The diagnosis of such a tumor may depend ultimately on histochemical tests, such as the Schmorl reaction.

Incidence

Although primary neoplasms of the small bowel occur more frequently than metastatic lesions, malignant melanoma is the most common tumor to metastasize to the small intestine.[1] This is occasionally observed at autopsy in patients dying of melanomatosis. However, clinical manifestations as a result of intestinal metastases are uncommon. In a review, Willbanks and Fogelman[2] found less than 40 previously reported cases, to which they added 18 cases of their own. MacBeth and Gwynne[3] reported an additional seven cases. In metastasizing, melanoma appears to have a mild affinity to the submucosa and muscularis of the small intestine.

Occult Nature

Apparent absence of a primary lesion (as in Case 1) is not unusual. In many instances the patient will forget or disregard a small skin lesion. Again (as in Case 2), the primary lesion, or the history of its previous removal, may be overlooked or ignored by the examining physician. Finally, a few cases have been reported[4] in which the primary tumor appeared spontaneously to regress after having metastasized. In the previously mentioned series of Willbanks and Fogelman,[2] and of MacBeth and Gwynne,[3] the primary skin lesion could not be found in 7 of 25 patients with clinical intestinal manifestations of metastatic melanoma. In considering all melanomas, a tumor which could be reasonably considered a primary site was not found in 2.1 per cent of patients in a large series of 934 patients.[5]

(Continued on page 528)

Anesthesia for Fractured Hips

Innovar Versus Halothane

G. L. MOSHER, M.D.* *and* ROBERT H. ROBINSON, M.D.,* *Wichita*

GERIATRIC PATIENTS with fractures of the hip represent an increasing number of anesthetic challenges at our hospital. We feel, without proof, that these patients do better clinically under light general, rather than under spinal, anesthesia.

Recently, we began using Innovar-N_2O-O_2 anesthesia for these patients, in an attempt to decrease the incidence of intraoperative hypotension associated with our usual technique of employing Halothane-N_2O-O_2. As clinical experience may not always be borne out by fact,[1] we reviewed our recent experience with hip fractures in the geriatric patient with particular reference to the intraoperative effects of the two anesthetic techniques.

Method

Charts of all cases of hip fractures, treated in our hospital during the one-year period in which we changed anesthetic technique, were reviewed retrospectively. There were 90 cases of open reduction and internal fixation, and 80 cases of Austin-Moore prosthesis insertion. Cases reported within each anesthetic group were done consecutively. Review encompassed the entire duration of hospital stay and, for the purposes of this study, postoperative mortality figures include all deaths occurring during the period of hospitalization.

Results

Of the 170 patients reviewed, the average age of the 62 who received Halothane was 73.1 years; the average age of the 108 who received Innovar was 78.1 years. The average age of the 90 who had open reduction and internal fixation (OR and IF) was 77.2 years; while those who had replacement prosthesis averaged 75.3 years. Overall average age was 76.3 years *(Table I)*.

Eighty-one per cent of our patients were beyond the sixth decade; 92 of 135 (70%) preoperative electrocardiograms were reported as abnormal.

Our patients demonstrated the usual female predominance with a female to male ratio of 4:1.

Drugs and dosages were individualized according to the needs of the patient, but usually consisted of a narcotic plus atropine.

Forty-seven per cent of the patients had replacement prosthesis, and 53 per cent had OR and IF.

A comparative clinical study of anesthesia for 170 consecutive hip operations was done using Innovar (108 patients) and Halothane, Nitrous Oxide (62 patients). No significant difference could be found between the results using two anesthetics. Parameters reviewed were: age, length of surgery, calculated blood loss, fluid and blood replacement, temperature elevation (postoperatively), duration of hospitalization, and mortality.

* St. Francis Hospital, Wichita, Kansas.

TABLE I
AGE OF PATIENTS

Age—Years	*Number of Patients* HALOTHANE	INNOVAR	OR AND IF	PROSTHESIS
Under 50	2	0	1	1
50-59	3	2	3	2
60-69	16	9	11	14
70-79	21	46	32	35
80-89	18	43	37	24
Over 90	2	8	6	4
Total	62	108	90	80

Halothane was administered in small concentrations with 50 per cent N_2O in O_2 following a dose of sodium thiopental. Innovar was administered by drip for induction and supplemented with 70 per cent N_2O in O_2 with intermittent doses of fentanyl. Eighty-eight per cent of the patients were intubated following succinylcholine administration. Thirty-six per cent of the patients received Halothane, while 64 per cent received Innovar. Of those patients having OR and IF, 70 per cent received Innovar and 30 per cent received Halothane. Of those patients having replacement prosthesis, 56 per cent received Innovar and 44 per cent received Halothane.

The lowest blood pressure recorded during the operation was noted and compared to the blood pressure recorded when the patient arrived in the operating room *(Table II)*. With Halothane anesthesia, systolic and diastolic pressures decreased to average 32 per cent and 24 per cent respectively. With Innovar anesthesia, systolic and diastolic pressures decreased to average 32 per cent and 27 per cent respectively.

TABLE II
BLOOD PRESSURE

	Preoperative (mmHg)		*Intraoperative*	
Agent	SYSTOLIC	DIASTOLIC	SYSTOLIC	DIASTOLIC
Halothane	143	79	97	60
Innovar	134	67	91	49

A heart rate of greater than 100 beats per minute, excluding the immediate postintubation period, occurred during the procedure in 32 per cent of the patients receiving Halothane, and in 37 per cent of the patients receiving Innovar.

Anesthetic exposure time *(Table III)* was highly variable, ranging from one and one-half to over three and one-half hours. Preparation time (time lapse from the beginning of anesthesia to start of operation) averaged 41.5 minutes with Halothane, and 53.8 minutes with Innovar anesthesia.

The first postoperative hemoglobin *(Table IV)* (usually drawn the morning following surgery) was noted and compared with preoperative hemoglobin values. On the average, the postoperative value was decreased in excess of one gram, but extreme variability was apparent. The limits of individual fluctuations are listed in *Table V*.

TABLE III
DURATION OF ANESTHESIA

	Minutes	
Group	MEAN	RANGE
Halothane	132	90-220
Innovar	144	90-215
Prosthesis	143	90-220
OR and IF	134	90-200

TABLE IV
HEMOGLOBIN

	Grams %	
Group	PREOPERATIVE	POSTOPERATIVE
Halothane	13.2 (10.5-17.8)	12.4 (9.2-16.0)
Innovar	13.2 (8.8-16.7)	12.0 (9.0-16.4)
Prosthesis	13.7 (10.5-17.8)	12.6 (9.8-16.4)
OR and IF	12.8 (8.8-16.0)	11.4 (9.0-15.1)

TABLE V
GREATEST INDIVIDUAL HEMOGLOBIN FLUCTUATIONS

	Deviation From Preop Value (Gm%)	
Group	DECREASE	INCREASE
Halothane	3.9	3.7
Innovar	5.1	3.6
Prosthesis	5.1	3.7
OR and IF	4.2	3.0

Intraoperatively, those patients under Halothane anesthesia received an average of 1.2 L of balanced salt solution plus 1.2 units of whole blood. Those patients under Innovar anesthesia received an average of 1.4 L of balanced salt solution plus 1.3 units of whole blood.

Of the 170 patients, 104 (61%) had temperature elevations in excess of 37.8C (100F) during the postoperative period.

Duration of hospitalization *(Tables VI and VII)* was not significantly different for any age group, anesthetic technique, or surgical procedure.

TABLE VI
MEAN DURATION HOSPITALIZATION

Age—Years	*Number of Days*
Under 50	25.0
50-59	21.2
60-69	26.4
70-79	26.1
80-89	25.6
Over 90	26.9

TABLE VII
MEAN DURATION HOSPITALIZATION

Agent	*Number of Days* PROSTHESIS	OR AND IF
Halothane	26	31
Innovar	26	23
Total	26	26

There were seven deaths in this group of patients, giving an overall mortality of 4.1 per cent *(Table VIII)*. In contrast to Allen's series,[2] 22 of the 23 patients in this series, whose hospitalization exceeded 40 days, survived.

The mortality rate for OR and IF was 6.7 per cent, while that for prosthesis was 1.2 per cent. This is the reverse of the relationship reported by Stein,[3] and agrees with that reported by Lawrence.[4]

In agreement with the findings of Davie,[5] mortality rate did not correlate significantly with duration of anesthesia.

In contrast with the findings of Lorhan,[6] mortality rate did not increase in the older age groups.

TABLE VIII
REVIEW OF DEATHS

Concurrent Diseases	*Age (Yrs.)*	*Procedure*	*Anesthetic*	*Duration of Anesthesia*	*Day of Death*	*Cause of Death*
Previous CVA and MI	78	Prosthesis	Halothane	105	43	CVA, CHF
Uremia	76	OR and IF	Innovar	120	15	Uremia, GI bleeding
ASHD						
COPD	77	OR and IF	Innovar	190	2	Acute resp. failure
ASHD	81	OR and IF	Innovar	155	15	Massive pulm. embolism
Renal and Pulm. Ca.	74	OR and IF	Innovar	125	17	MI
Prev. MI	92	OR and IF	Innovar	120	1	Aspiration pneumonia
ASHD	81	OR and IF	Innovar	155	14	MI

Discussion

As reported previously,[3] the morbidity associated with the two surgical procedures in this review is essentially equal. However, our data indicated a greater mortality associated with OR and IF than with replacement prosthesis. This may be a reflection of a larger number of older patients receiving Innovar in the OR and IF group, or it may reflect mere bias of the surgeon in selecting the procedure.

The degree of hypotension we observed with the two anesthetic techniques was the same. No counterbalancing parameter could be found among age, time, estimated blood loss, heart rate, or fluid and blood replacement. It should again be noted, however, that individual estimates of blood loss and replacement were highly variable and underestimates in this regard may make substantial contributions to transitory hypotension.

Summary

We reviewed 170 patients with fractures of the hip and compared the use of Halothane and Innovar anesthesia.

Of all our patients, 81 per cent were at least 70 years of age.

No significant differences could be found among the parameters of age, operative procedure, intraoperative hypotension, duration of anesthesia, heart rate, calculated blood loss, fluid and blood replacement, temperature elevation, duration of hospitalization, or mortality.

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Myocardial Infarction and Urolithiasis

A Preliminary Communication

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This communication presents the discovery of disproportionately large numbers of myocardial infarction among people having suffered from urolithiasis, and consequently an unexpected frequency of urolithiasis in the history of patients suffering from myocardial infarction. The observed number of cases is too small to enable any conclusions to be drawn, but it justifies further research on the subject.

THE STUDY GROUP consists of 165 individuals who, during the last months of 1971, had been admitted to the hospital where the diagnosis of myocardial infarction had been confirmed. Since a personal interview conducted by the author was the initial source of information, only patients having survived the acute stage of the disease could be included. Others had to be omitted from the study group because their mental or physical condition was such that an interview was virtually impossible. Thus, the study group does not refer to any defined population.

The previous diseases were recorded on the basis of the patient's personal information. Further information concerning previous diseases was obtained from hospital records, the private physicians, company physicians, the records of local health insurance offices, and other sources. Siblings were used as the source of a comparison group, and they were selected among the available siblings on a one-sibling basis. Patients for whom no comparison sibling was available were excluded from the study. In 78 per cent of the cases, the comparison sibling was an elder sibling of the same sex; in 22 per cent of the cases only a younger comparison sibling of the same sex was available. The comparison siblings were all interviewed by the author.

Table I shows the distribution of the members of the study group and the comparison group according to sex and age. In this study group, 30 individuals (18.1%) had suffered from urolithiasis, the corresponding numbers for the comparison group were five and three respectively.

Table II shows details of the patients concerned. In 66 per cent of the cases, the first attack of urolithiasis had occurred less than ten years prior to the first attack of myocardial infarction; in two cases, from 10 to 40 years; and in five cases, after the first attack of myocardial infarction. There were two individuals suffering from pyelonephritis chronica, and one had aneurysma arteriae renalis. In the five patients of the comparison group suffering from urolithiasis, one had had a later attack of myocardial infarction.

In an attempt to study this problem in a defined population, the two diseases concerned were recorded retrospectively among all members of the local health insurance office of Bergen, Norway, who had died during 1968, 1969, and 1970. Urolithiasis and myocardial infarction were recorded merely when the diagnosis had been confirmed during a stay in hospital. In 1968, there were 1294 deaths; 161 of these had had myocardial infarction; 17 had had urolithiasis, and nine had had both diseases (expected number, 2.1, $P < 0.001$). In 1969, the corresponding numbers were 1369; 178, 25 and 8 respectively (expected number, 3.3, $P < 0.001$). The numbers for 1970 were: 1278; 183, 23 and 9 respectively (expected number, 2.1, $P < 0.001$).

The question arises whether the two variables are linked to the same individual factor.

The above findings do not justify any conclusion, but they justify research on the subject. If the findings are confirmed, other questions will arise.

It is known that vitamin D intoxication may provoke urolithiasis. Cholesterol is usually found togeth-

TABLE I

AGE AND SEX DISTRIBUTION

Age	*Study Group*		*Comparison Group*	
	MEN	WOMEN	MEN	WOMEN
35-39	0	1	0	0
40-44	8	0	7	1
45-49	19	0	20	0
50-54	15	5	15	5
55-59	24	13	24	12
60-64	28	14	28	15
65-69	18	9	18	8
70+	4	7	4	8
Total	116	49	116	49

TABLE II

30 INDIVIDUALS HAVING HAD BOTH UROLITHIASIS AND MYOCARDIAL INFARCTION

Sex	*Born*	*Urolith.*	*Myocard.*	*Infarct.*	*Serum-Chol. (mg %)*	*Comments*
M	1926	1970	1971	Inferior.	210	
			1971	Anterior.		
M	1922	1964	1964	Inferior.	200	
M	1921	1962	1971	Inferior.	220	Tub. pulm. antea.
M	1917	1963	1968	Anterior.		
			1971	Inferior.	426	
M	1917	1962	1971	Inferior.	320	
M	1914	1968	1956	Inferior.	268	
			1971	Inferior.		
M	1911	1955	1963	Inferior.		
		1971	1971	Anterior.	281	
M	1910	1958	1959	Anterior.		
			1971	Anterior.	540	Tub. pulm. antea.
M	1909	1960	1969	Posterior.	239	
M	1909	1944	1964	Anterior.	310	
			1971	Anterior.		
M	1909	1962	1971	Anterior.	228	
M	1908	1968	1965	Posterior.	249	
			1971	Posterior.		
M	1907	1961	1967	Anterior.	210	Alcohol. chron.
			1971	Anterior.		
M	1907	1956	1961	Anterior.	300	Pyelonephritis chron.
			1971	Anterior.		
M	1907	1963	1968	Anterior.	267	
			1971	Anterior.		
M	1907	1966	1956	Anterior.	399	mors subita 1972.
			1971	Anterior.		
M	1907	1956	1971	Anterior.	450	Malign. hypertension.
M	1906	1966	1971	Anterior.	320	Apoplexia cereb. 1968.
M	1905	1959	1971	Inferior.	195	
M	1905	1963	1966	Anterior.	260	
			1971	Anterior.		
M	1903	1930	1971	Anterior.	210	
M	1902	1950, 1953	1959	Anterior.	275	
			1971	Anterior.		
M	1898	1946	1971	Anterior.	349	Diabetes mellitus
M	1891	1956	1964	Anterior.	216	1970: cancer prostat.
			1971	Anterior.		cum metast.
M	1888	1955	1956	Anterior.	296	1942: prostatectomia.
			1971	Posterior.		Incontin. urinae.
F	1912	1965	1971	Anterior.	311	
F	1909	1971	1971	Posterior.	280	Aneurysma art. renal.
F	1906	1930	1971	Anterior.	320	Hypothyreosis.
F	1900	1968	1971	Anterior.	unknown.	Pyelonephritis chron.
F	1892	1963	1968	Inferior.	300	
			1971	Inferior.		

er with other sterols having been identified as provitamin D_3, or 7-dehydrocholesterol. In rabbits, it has been shown that 7-dehydrocholesterol is converted to cholesterol and may become atherogenic.

The question arises, what is the influence of vitamin D in the cholesterol metabolism.

An association between water hardness and cardiovascular mortality has been detected in many countries.[1-3] Is vitamin D, which is necessary for the calcium metabolism, of importance in this connection?

So far as the extensive use of vitamins today is

TABLE III

THE FREQUENCY OF UROLITHIASIS, MYOCARDIAL INFARCTION, AND COMBINATION OF THE TWO IN DEAD POPULATION

Year of Death	*No. of Patients*	*Urolithiasis*	*Myocardial Infarction*	*Urolithiasis & Myocardial Infarction*
1968.....	1294	17	161	9
1969.....	1369	25	178	8
1970.....	1278	23	183	9
Total.....	3941	65	522	26

Expected number of people having suffered from both urolithiasis and myocardial infarction:

$$\frac{522}{3941} \cdot \frac{65}{3941} \cdot 3941 = 8.6.$$

Observed number of people having suffered from both urolithasis and myocardial infarction = 26.

concerned, it seems appropriate to remember that usual food contains extremely low amounts of vitamin D, and that this vitamin has more of the hormonal properties being produced by the skin through the influence of sunlight.

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3. Schroeder, H.: *JAMA* 172:1902, 1960.

NURSE CLINICIAN PROGRAM

The Nurse Clinician Program sponsored by Kansas Regional Medical Program will be transferred from Kansas City to Wichita January 1, 1973. This new program for RNs was developed at KUMC under the leadership of Robert Brown, M.D., Jean Tomich, Ph.D., and Annette Craddock, Clinical Coordinator. Three classes have completed the didactic phase of the program and are in various stages of their preceptorships.

In Wichita, the program academically will be located within the College of Health Related Professions at Wichita State University. The medical director will be G. Gayle Stephens, M.D., who is also professor and chairman of the Department of Family Practice at the WSU Branch of KU School of Medicine. The project director will be Alma Yoe, R.N., M.Ed.

The program is designed to prepare RNs for an expanded role in ambulatory health care. Each RN student must have a physician sponsor who agrees to employ her and supervise her performance in the new role.

There are two program components. The first is an intensive eight-week didactic experience during which the students are in residence at WSU. The second is a ten-month preceptorship with the sponsoring physician. The subject areas covered are: review of basic sciences, interviewing, physical assessment, prenatal care, child health supervision, chronic disease surveillance, and problem oriented records. Specific office tasks are to be worked out between the individual nurse and the physician.

Trainee applications for admission to the initial January 1973 class should be directed to:

Ms. Alma Yoe, Director
Nurse Clinician Program
Wichita State University
College of Health Related Professions
Box 41
Wichita, Kansas 67208

Student
THESIS

The Arthritides: Pathogenesis and Radiologic Appearance

C. JAMES KIFER, M.D.,* ***Kansas City, Kansas***

THE ARTHRITIDES are a fascinating group of diseases embracing a broad spectrum of pathogenetic mechanisms ranging from infectious destruction to diseases of complex immune mechanism. It is the purpose of this paper to give a kinetic approach to the radiologic evaluation of joint disease based upon an understanding of the different manifestations of each disease. This is best achieved by an appreciation of the pathogenesis of the disease. Discussing the joints from both normal and the more common pathologic perspectives should permit a more profound understanding, so that rarer, miscellaneous conditions not considered in this discussion can also be detected when encountered.

Because of the wide scope of the topic, discussion is limited to several pathogenetic mechanisms which affect joint structures, so as to produce different radiologic pictures. Often, however, one may easily go beyond this to extrapolate symptoms and laboratory findings from the information given. The intention is to include here only the most essential information necessary to elucidate the various disease mechanisms, so that the pathogenesis and its relation to the radiologic appearance may be clearly understood.

*This is one of a group of theses written by fourth year students at the University of Kansas School of Medicine, selected for publication by the Editorial Board from a group judged to be the best by the faculty at the School. Dr. Kifer is presently serving his residency at the Kansas University Medical Center, Kansas City, Kansas 66103.

Publication of this work was made possible through a grant by the Kansas Chapter of the Arthritis Foundation.

Normal Joint

In the development of joints during embryologic stages the bony structures evolve from mesodermal buds. Condensation of the mesoderm occurs, followed by chondrification and ossification. At joint sites, transverse disks form from mesenchymal condensation, separated by amorphous intercellular substance. Clefts appear within this space, which fuse to form the synovial cavity. The outer layer of mesenchyme differentiates into the capsule, the inner into the synovial membrane. The resultant structure is shown diagramatically in *Figure 1,* as a typical freely movable (diarthrodial) joint, such as the knee. Note that the synovial membrane lines a closed space within the joint. It extends in its upper reaches beneath the capsule onto the shaft of the bone. This arrangement assumes importance when considering diseases affecting the synovial membrane.

If one considers the various components of the joint, an understanding of their structure and function can be developed. The articular cartilage is of prime interest. It contains chondrocytes embedded within intercellular substance. Three layers of chondrocytes can be distinguished with the deepest layer being the youngest. Ground substance, chondroitin sulfate, is secreted by these young cells. Intercellular substance consists of collagen fibers embedded within this ground substance. One must understand the relationship between these two components of intercellular substance in order to understand diseases affecting cartilage.

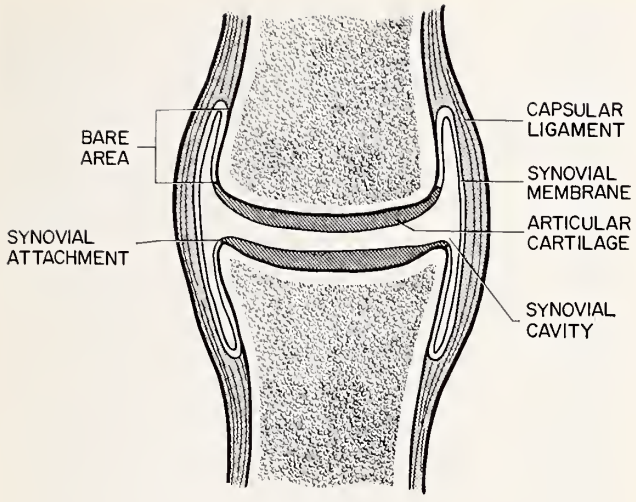

Figure 1

Chondrocytes are partially nourished by capillaries from underlying bone, but since cartilage itself contains no blood vessels, lymphatics (or nerves) metabolites must reach most cartilage cells by diffusion from the synovial fluid. Fragments of cartilage broken off by injury or disease and completely free in a joint may survive and even grow there. Additionally, chondrocytes have a very low metabolic rate, their oxygen consumption being almost negligible.[1] These factors also help to explain why injury to mature cartilage heals very slowly, if at all.

Branches of arteries approaching a joint go to capsule, epiphysis, and synovial membrane. A rich vascular network is thus formed in the synovium. This assumes great importance in understanding both the production of synovial fluid and pathology of the synovium.

The joint interior receives innervation from the same trunks which supply the muscles acting over the joint. Larger neurons are afferent neurons of the Ruffini type. They are sensitive to pressure changes and probably to proprioception. Smaller neurons traverse the capsule and ligaments, ending in free nerve endings sensitive to pain. This is important in understanding the neuropathic (Charcot's) joint. The synovial membrane itself is not well supplied with nerve fibers, and is relatively insensitive to pain.

Synovial fluid is simply an ultrafiltrate or dialysate of blood to which mucin is added by synovial cells. The mucin is hyaluronic acid which is highly polymerized. Mucin gives synovial fluid its viscosity and increases its lubricating properties. Transport of substances through the synovial membrane is passive and is determined by particle size. Metabolites and soluble drugs cross easily, but proteins must depend on lymphatics for transport. Particulate matter in the joint is removed by phagocytes.

With an understanding of some of the anatomy, physiology, and biochemistry of joints, one may consider the various pathophysiologic processes which may occur in them.

Infectious Arthritis

Distinctive differences in the pathogenesis of septic arthritis permit division of this entity into suppurative and tuberculous (or chronic infectious) arthritis.

Suppurative arthritis simply refers to an acute pyogenic infection occurring within the joint space. The usual pathogenesis of this disease is from the hematogenous dissemination of an infection previously localized elsewhere in the body. If the organisms reach the rich vascular bed of the synovial membrane, they cause an inflammatory synovitis exactly paralleling severe inflammation elsewhere in the body.

The most common causative organisms of septic arthritis are gonococcus, staphylococcus, streptococcus, and pneumococcus. Joint infection most often occurs in the age range of 10 to 40, but may occur at any age. Gonococcal genitourinary infection, pneumonia, and endocarditis most often represent the antecedent infection.

The large joints—including the knee, hip, ankle, elbow, wrist, and shoulder—are most frequently affected. The sternoclavicular joint seems to be an additional favored site.[2] Most often the infection is monoarticular.

The inflammatory reaction which occurs has been studied by many investigators,[3-5] and cartilage damage seems to be the critical factor explaining the changes observed in infected joints. Cartilage destruction is brought about by the breakdown of its components by organisms and their enzymes. Although many enzymes (such as plasmin) have been implicated, the current feeling is that the primary site of cartilage destruction in infection is in the cartilage ground substance. Chondroitin sulfate is degraded, whether by leukocytic enzymes, enzymes from the various infecting organisms, or by other agents not yet discovered. Collagen is involved only secondarily. Collagenase is not usually present, and in its absence the essential ingredient of collagen destruction may be the pressure and friction present in the septic joint which grinds away the unsupported collagen fibrils.[3]

The inflamed synovial membrane (pannus) may contain and limit the infection. In other cases, the organisms may ulcerate into the joint space and synovial fluid. These and other factors account for cultures of joint fluid being positive in only 50 per cent of the cases of septic arthritis.[3] The infection and inflammation may subside at any stage, especially with antibiotic therapy, or they may become

chronic. Eventually, the diseased tissues may be replaced by fibrous tissue or even result in ankylosis of the joint.

The radiologic features of septic arthritis rarely aid in the early diagnosis since the inflamed pannus is of soft tissue density and is poorly seen by x-ray. The physical and radiologic findings are predictable from the pathologic changes. Joint distribution is important and follows the pattern discussed. The fact that most joint infections are monoarticular is highly important, with gonococcal arthritis accounting for more cases of monoarticular disease than any other type of infection.

The pathogenesis and progression are potentially very rapid, with the total destruction of a joint possible within three to seven days. Purulent effusions distend the joint space, so this finding may be observed early on the x-rays. Juxta-articular osteoporosis will not be observed early; but cartilage destruction and joint space narrowing, as well as the irregularity of subchondral bone occur soon after onset, and osteoporosis may also occur at this stage. Later, if untreated, the joint space continues to narrow, destruction is extensive, and fibrous or bony ankylosis may result. Other findings sometimes seen may include soft tissue swelling and, in children, epiphyseal separation.[6]

Tuberculous arthritis is encountered principally in children and results from pulmonary infection in 75 per cent of cases. It usually occurs by hematogenous spread and 85 per cent of cases are monoarticular.[6] Generally, it affects the same joints as suppurative arthritis. The spine is one notable exception (Pott's disease), accounting for about one-third of cases. Spinal involvement is followed in incidence by tuberculosis of the hip, knee, elbow, wrist, shoulder, and even the sacroiliac joints. Analogous to suppurative arthritis, tuberculosis of the joint follows essentially the same pathogenetic sequence as tuberculosis infection elsewhere. Tuberculous arthritis is slowly progressive, taking months to years; while suppurative arthritis usually occurs rapidly, in terms of days. Initially, edema, congestion, and synovial thickening occur. The diseased synovial membrane becomes studded with tubercles, some of which may become confluent. Without treatment, the course becomes chronic with further synovial pannus formation, cartilage destruction, erosion and demineralization of adjacent bone with irregular healing, finally terminating with extensive fibrosis and ankylosis. The capsule may be eroded, producing draining skin sinuses.[2] Tuberculous arthritis is a serious disease, difficult to diagnose and treat, and very destructive and prolonged in its behavior.

Again, the radiologic features of tuberculous arthritis are predictable, although not diagnostic. Swelling of surrounding tissue occurs, but there may be no distinctive findings for weeks or months. Osteoporosis of adjacent bone gives it a ground-glass appearance and later there may be a severe degree of bony atrophy. Joint space narrowing is observed as cartilage is destroyed. When there are large areas of bony destruction, changes in alignment (such as kyphosis) result as the bones collapse. Another clue seen occasionally is sclerosis of bone about the margin of a tuberculous lesion.[6] It should be emphasized that a radiographic diagnosis of tuberculous arthritis cannot be made with certainty, and appropriate clinical information, especially culture and biopsy, are essential. Without these, other bacterial, *e.g.,* brucellosis, or fungal, *e.g.,* sporotrichosis, infections may be confused with tuberculosis. Even so, the diagnosis cannot be made at all unless it is suspected *(Figures 2, 3).*

Gouty Arthritis

Uric acid is uniquely the normal end product of purine metabolism in primates, including man. It is derived both from purine degradation and synthesis from basic chemical components. Uric acid is normally excreted mainly in the urine. Gouty subjects either produce excessive uric acid or excrete it in abnormally low amounts.

Gout may be either primary, where some genetically determined defect in uric acid metabolism is manifest, or secondary, with an increased production or retention of uric acid caused by another disease or by drugs, *e.g.,* polycythemia or chlorothiazide. In any event, hyperuricemia appears to be the pivotal abnormality in gout, causing acute and

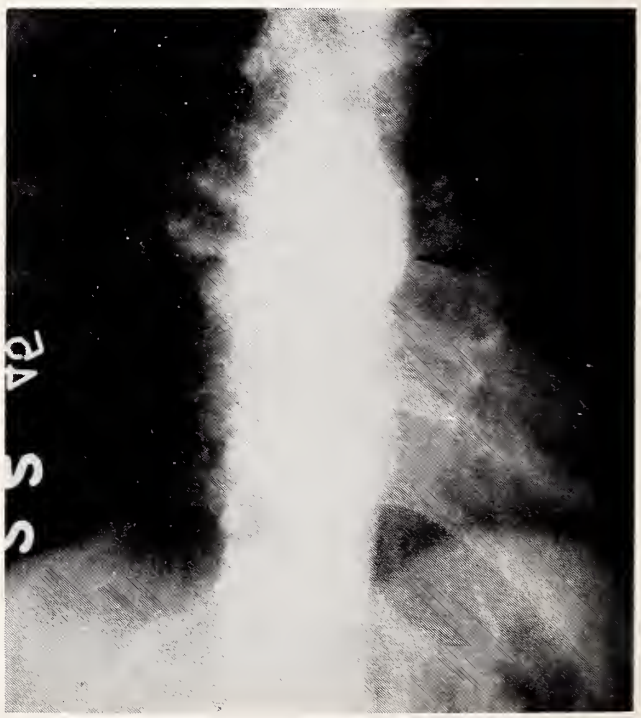

Figure 2. Tuberculosis involving spine (Pott's disease). P-A roentgenogram showing paraspinous mass.

Figure 3. Same case, lateral view. Note nearly complete destruction of vertebral body with characteristic Gibbus deformity of spine. The interspace is involved. Non-tuberculous septic joints also have cartilage destruction.

chronic arthritis by deposition of the highly insoluble and inflammatory monosodium urate in and about joint structures.[2] Gutman[7] has shown that primary gout is usually due to overproduction rather than underexcretion of uric acid.

Several genetic dislocations may account for the overproduction of uric acid. Wingaarden[8] proposed the inhibition of the feedback mechanism, whereby excessive uric acid shuts off further urate production. Other possibilities or combinations of possibilities exist, but whatever the mechanism causing overproduction of uric acid may be, there are still other considerations involved in the development of gout. For example, the prevalence of hyperuricemia in gouty families has been reported to be as high as 72 per cent, compared to a 2 per cent incidence in the general population. Still, only 20 per cent of all people with hyperuricemia ever develop gout, and gout is almost never seen in premenopausal women.

The precipitation and deposition of uric acid represents the actual pathogenesis of gout. Seegmiller[9] indicates that the site of deposition of urate may be dependent upon the pH gradient between plasma and tissue, since uric acid is least soluble in an acid medium. Cartilage, tendon, and joint capsule are relatively avascular, so they must obtain their energy primarily from the glycolytic pathway.[9] Lactic acid is the end product of this pathway under anaerobic

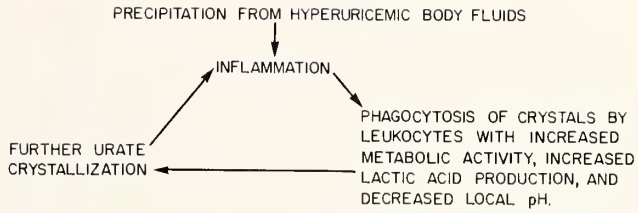

Figure 4. Modified from Ref. 9, J. E. Seegmiller *et al.*

conditions, and lactic acid may provide a lowered pH which can precipitate urate. Furthermore, since these tissues are avascular, the lactic acid can be eliminated only very slowly. The deposition of urate crystals within the joint space is enormously irritating and causes a tremendous synovitis and inflammatory reaction. This has been demonstrated by injecting sodium urate microcrystals into the synovial cavities of normal men. Within two hours, a sudden inflammatory arthritis was produced which persisted for 72 hours in spite of treatment. Aspirated joint fluid showed intraleukocytic urate crystals.[10] Once started, an attack of gout may be perpetuated by additional lactic acid produced by the leukocytes which are phagocytizing the crystals, which causes further drop in pH, precipitation of more urate crystals, and a vicious cycle is started *(Figure 4)*.

One therapeutic effect of colchicine may be to inhibit the ingestion of urate crystals by the granulocytes, interrupting the cycle by stopping their excess metabolic activity and lactic acid production.[9] Any anti-inflammatory drug that works for acute gout must do so by interfering with this cycle at some point.

Local trauma may also increase the glycolytic rate and cause urate deposition in a similar manner. Lactic acid production is a general response of injured or inflamed tissue. Seegmiller[9] noted that, "In this connection it is worth considering that the tissues beneath the head of the first metatarsal bone are subject to a greater weight per square centimeter than any other tissue of the body."

Crystalline sodium urate is deposited radially in the superficial portions of the articular cartilage, in the synovium, capsule, and surrounding tissues including tendons and subchondral bone marrow. It evokes a characteristic inflammatory response and erodes bone. The most typical gross lesion of gout is the tophus, a focal deposit of chalky urate surrounded by inflammatory hyperemia. Surrounding the deposits, fibroblasts, inflammatory leukocytes, and foreign body giant cells are found. In soft tissues, expansion occurs to accommodate the deposit. In cartilage or bone, erosion occurs which may destroy the joint surface.

In considering the radiologic picture of the gouty joint, several features are prominent. First, one should realize that 95 per cent of patients with pri-

mary gout are men. Distribution of lesions is also important. The first metatarsophalangeal joint is affected most often (80% at one time or another), followed by the instep, the heel, the ankle, and knee in that order. The disease usually affects men over 40 years of age, and 70 per cent of early cases are monoarticular.[6] The radiographic picture may be entirely normal in two-thirds of patients with gout. When changes do occur, they consist of asymmetrical, periarticular swelling with small "mouse-bite" lesions in the juxta-articular area. Urate is radiolucent, but tophi can sometimes be visualized as soft tissue masses; whether or not tophi are seen, flecks of calcium in soft tissue may imply their presence.

One special radiographic feature of bone erosion has been described by Martel[11] and deserves mention. It is called the "overhanging margin of bone" and consists of an elevated bone margin in proximity to a tophaceous deposit. The outward displacement of the thin shell-like bony shelf away from the normal bone contour is especially significant. Martel postulates that the displacement reflects the gradual increase in size of the tophus. As crystals are added, bone resorption occurs at the interface. Periosteal bone apposition on the outer aspect of the bony spur causes it to be displaced outward and to project like a shelf over the tophus *(Figures 5-8)*.

Rheumatoid Associated Diseases

Rheumatoid Arthritis

From the outset, it must be stressed that rheumatoid arthritis (or more properly, rheumatoid disease) is a systemic disease. To underscore this principle, one should recall that certain pathologic alterations (nodules) are observed with relative frequency in the pleural surfaces, lungs, heart, sclerae, meninges, spleen, and so on. These are indistinguishable from nodules found in the joints and subcutaneous areas. Rheumatoid arthritis is basically a chronic inflammatory process. Its etiology is unknown; however, many observations have been made regarding its pathogenesis and natural history which allow construction of reasonable theories of etiology.

The prevalence of rheumatoid arthritis in the general population is about 3 per cent, with the female sex predominance of 3:1. The onset is usually between 20 and 40 years of age, with the disease typically beginning insidiously with malaise, fatigue, weight loss, and morning stiffness in the small joints of the hands and feet. Of all the patients with rheumatoid disease, 95 per cent eventually have positive serologic tests for rheumatoid factor.[2]

Considering diseases thought to be of immune origin, such as rheumatoid arthritis, it has been shown

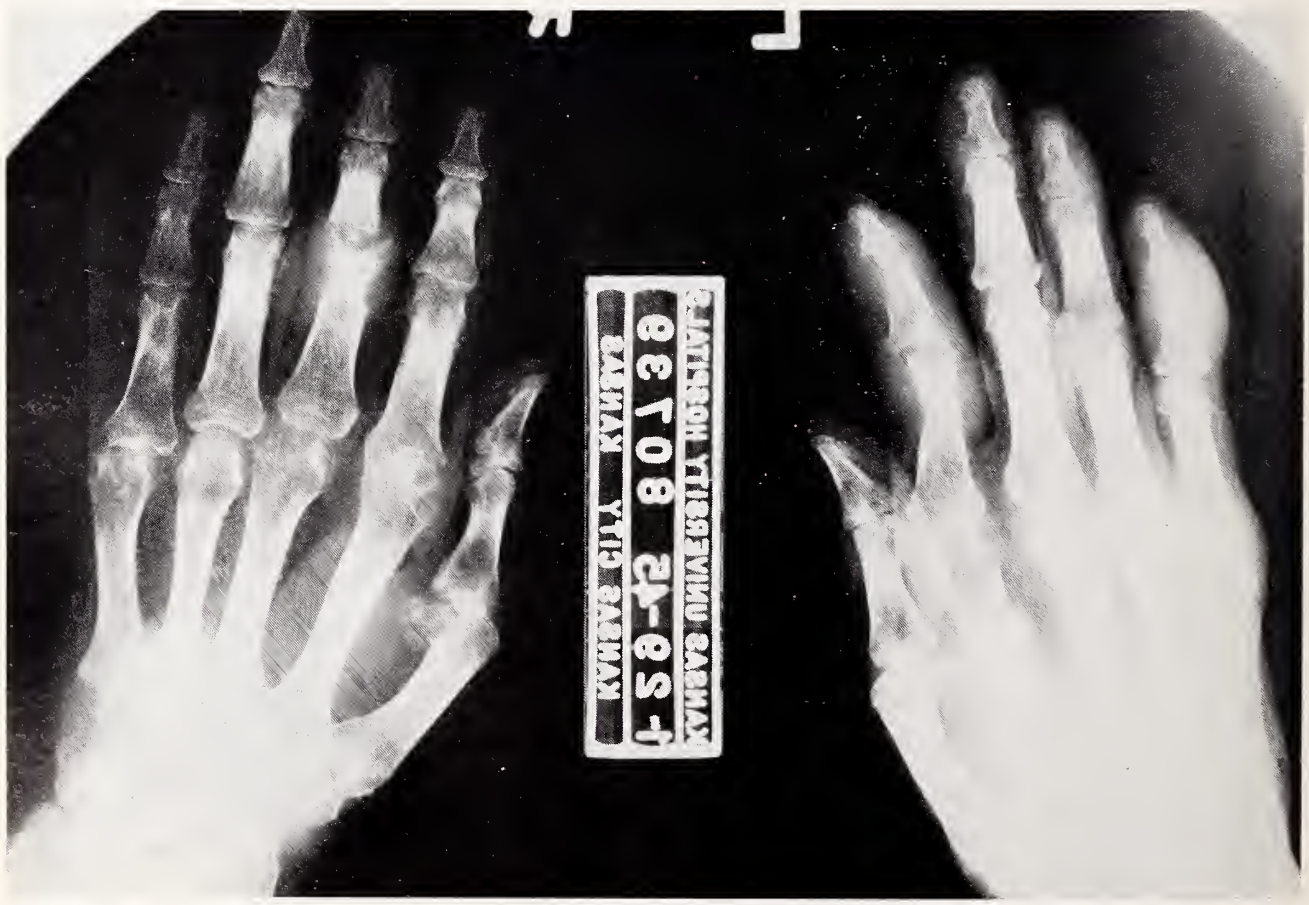

Figure 5. Gout involving the hands. Soft tissue densities, tophi, and widespread joint destruction. Note in particular the head of the right second metacarpal.

Figure 6. Gout involving the feet. Note severe involvement of the first MP joints.

that a simple injection of Freund's adjuvant may produce a polyarthritis in rats.[12] This arthritis is often insidious in onset and involves the ankles, wrists, tail, and smaller joints of the extremities, especially the terminal interphalangeal joint (TIP). The pathologic alterations which include synovitis, periarthritis, pannus formation, cartilage destruction, and fibrous or bony ankylosis are similar to rheumatoid arthritis in man. In addition to the arthritis, other later lesions have been described in this model, including iridocyclitis, skin nodules, rashes, genitourinary lesions, and diarrhea. Some of the analogies with rheumatoid arthritis, ankylosing spondylitis, psoriatic arthritis, ulcerative colitis, and Reiter's syndrome are striking.

From an experimental situation in animals, we may now consider rheumatoid arthritis in man and the question of how the injury actually occurs, how it progresses pathologically, and finally, how this manifests itself radiologically.

In regard to the first question, it is generally accepted that the alterations which take place result from an inflammatory reaction in the tissues. Its trigger may be immunologic, infectious, or nonspecific. Inflammation is enormously complex and involves many mechanisms and systems. Immunoglobulin and complement deposits have been observed on the synovial tissues of patients with rheumatoid diseases resembling those found in the glomeruli of patients with disseminated lupus erythematosus nephritis.[13, 14]

Intra-articular complement consumption has been shown to occur in rheumatoid arthritis despite relatively normal serum complement levels. The complement system helps to mediate immune injury. The complement components function in a sequence with the generation of several distinct activities resulting in cell lysis or other membrane effects.[14] The membrane effects which occur cause the release of vasoactive compounds and lysosomal enzymes, which in turn cause tissue destruction. Such enzyme activity has been observed to be increased in rheumatoid cells.[15] In rheumatoid arthritis, the main cellular constituents of synovial membrane, type A cells, have been noted to be massively increased in numbers. Each cell is replete with large numbers of lysosomes.[16] Enzymes contained in the lysosomes include those with catheptic, aminopeptidase,[17] and even collagenase[19] activity; however, it is felt that the cartilage disruption which occurs is mainly a result of enzyme mediated chondromucoprotein dissolution. This can be easily demonstrated by a rapid fall in the viscosity of this substance when incubated with extracts of rheumatoid synovium, or with extracts of leukocytes from peripheral blood.[19] This is completely analogous to the cartilage ground-substance destruction previously mentioned in infectious arthritis, and seen in other diseases to be discussed later.

To summarize this extremely complicated mechanism, one starts with one or more antibody-antigen interactions. The antibody-antigen complex activates the complement sequence, and then deposits itself on the synovium and other tissues. The aggregate is engulfed by neutrophils while the complement sequence is producing substances which cause chemotaxis, vasoactive amine release, cytolysis, and cellular lysosomal enzyme release. Normal enzymes in abnormal surroundings begin to destroy tissue, increase inflammation, and further propagate the cycle.

This injury is reflected in a series of dynamic pathologic alterations. Kulka[20] has observed this process experimentally and proposes a series of events which help to explain it. He feels that small vessel injury, predominantly venular vasculitis, is the primary pathologic finding. It is accompanied by marked exudation, fibrin formation, and endothelial proliferation which causes vessel obliteration. Ischemia results causing foci of degeneration, which, if in the synovium, could act as irritants to stimulate pannus formation. The deposition of fibrin acts as a barrier to diffusion, further enhancing the ischemia

Figure 7. Gout, again showing predilection for the MTP joints, and the potential for severe joint destruction.

and perpetuating the cycle. Pannus formation in rheumatoid arthritis is the resultant of all the abnormal forces thus far discussed, from microinjury due to abnormal immune aggregates, to enzyme digestion of capillary endothelium and ischemic change. The mechanism for formation of the pannus provides us with a framework for understanding further destructive changes which occur within the joint.

The pannus consists of a synovial membrane showing marked villous hypertrophy, proliferation of superficial synovial cells, chronic inflammatory cell infiltration (mostly plasma cells and lymphocytes, producing lymphoid nodules), fibrin deposition, and foci of necrosis. The pannus thus formed may overgrow and destroy cartilage and, according to Kulka, only that cartilage in close contact with the pannus is affected. He suggested that the products of ischemic tissue may initiate local autolysis. Fibrin collects on the surface of the pannus and further perpetuates ischemia by causing a barrier to diffusion of nutrients between synovial fluid and cells.

One can anticipate other changes which occur as a result of the pathogenetic sequence described. Joint effusion and soft tissue swelling occur early. Periarticular tissues become involved by the adjacent inflammation, and bone and muscle atrophy occur. The latter may be due to neurogenic or hyperemic factors, or immobility, but all of these probably contribute.[21, 22] Ultimately, the pannus may bridge the joint space, providing the framework for the development of fibrous scar tissue, calcification, and finally ankylosis.[2]

Malalignments and subluxations commonly occur late in the disease and have been explained in terms of mechanical stresses placed on the weakened joint.[21, 23] Inflammatory changes in periarticular structures (tenosynovitis is a conspicuous feature) cause edema and laxity of surrounding ligaments. This, along with eroded cartilage which allows compression of unprotected, demineralized bone ends may change the balance of muscle groups acting over the joint, so that weakened joint supporting structures are easily displaced. The pattern of malalignment will be reviewed subsequently.

Understanding these pathogenetic events which occur in rheumatoid disease, with particular emphasis on the concept of the invasive and lytic pannus as the mediator of pathologic changes, one can truly appreciate and even predict resulting roentgenographic changes.

Initially, distribution among joints must be considered. Rheumatoid arthritis usually first affects the smaller joints, principally of the hands, feet, wrists,

Figure 8. Gout, manifesting itself as an asymmetrical mouse-bite lesion. Note sparing of the other joint structures.

and temporomandibular joints. The knees, hips, and other joints may also be involved.[2, 24] Within the hand and wrist, a definite predilection for metacarpophalangeal (MP), proximal interphalangeal (PIP), radiocarpal, and intracarpal joints is observed.[21]

The MP and PIP joints of the index and middle fingers tend to be involved earlier and more frequently than the others. Since all the intracarpal joints (except the pisitriquetral joint) share a common synovial cavity, they tend to be involved simultaneously. In like fashion, the synovial cavity between the intermetacarpal and carpometacarpal joints (except the thumb) are in communication, again providing the anatomic basis for the fact that these groups also tend to be involved simultaneously. Monoarticular rheumatoid arthritis is rare in adults (as opposed to gout or infectious arthritis), allowing one other parameter to elucidate the cause of undiagnosed joint changes. A diagram showing common areas of involvement in rheumatoid arthritis is shown in *Figure 6*. These areas primarily represent bare areas, previously mentioned, where synovium covers bare bone.

Knowing which joints are usually affected and the pathogenesis of change, we should now delineate how these changes appear on x-ray. Soft tissue swelling about the joint is often the first, and perhaps the only, early roentgen change. It is due to effusion and inflammation in and around the joint. Swelling in the area of the ulnar styloid occurs often,[21] and should alert the radiologist to the possibility of rheumatoid arthritis. Swelling of peripheral finger joints is usually fusiform, but may be lobulated corresponding to the hyperplastic synovium. As the synovium covering the metacarpal heads becomes hyperplastic, one may observe an early loss of definition of the fine cortical bone at these sites. This is also thought to be a very early but indistinct finding in this disease.[25]

Demineralization, as noted before, initially occurs in juxta-articular bone. It may be spotty, particularly in rheumatoid arthritis of acute onset. In children and adolescents, demineralization may be metaphyseal rather than epiphyseal, indicating that chronic hyperemia may be an important factor here.

The joint space usually shows uniform narrowing. This has been postulated to be due to dehydration of the cartilage, resulting from mucoprotein ground substance degradation by enzymes, which decreases the water binding capacity of cartilage.[19] Narrowing is uniform, since all cartilage is involved at the same time. This is an important differential point, since the joint space in gout and infection is involved

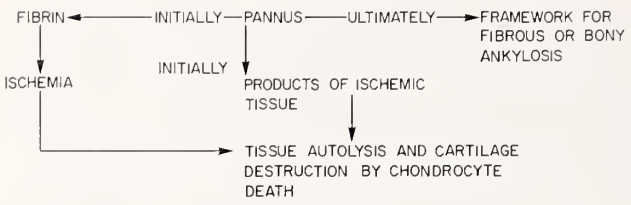

Figure 9

asymmetrically, and in degenerative arthritis it is noted to be uneven. Erosion of the metacarpal head occurs early in rheumatoid arthritis in an involved joint, and is usually present by the time the joint space is narrowed. Rarely do the joint spaces appear to be widened, presumably due to joint effusion and pannus filling the space, along with relaxation of collateral ligaments.

Malalignment and subluxation occur later in the disease and consist most often of hyperflexion of distal interphalangeal joint (DIP) and hyperextension of PIP joints (or vice versa), flexion deformity of the MP joint of the thumb with dorsal displacement of terminal phalanx, and ulnar deviation of MP joints with volar subluxation. Deviation of the radiocarpal joint may occur and may even progress to volar dislocation of this joint. Diastasis of the distal radio-ulnar joint occurs, and lateral views may reveal dorsal displacement of the ulna with respect to the radius. The mechanism of these changes has already been discussed.

Bone erosions are classified by Martel[23] into marginal erosions, compressive erosions, surface resorption, and pseudocyst formation. He has shown that marginal erosions occur in the areas where joint capsule and collateral ligaments attach, and where bone is covered by a reflection of synovium but not covered by articular cartilage *(Figure 1)*. These areas, in which the synovium forms a potential pocket, are called "bare areas," and are seen to lie between the margin of the cartilage and the inner aspect of the capsule. In these areas hyperplastic, invasive pannus can erode underlying bone directly. A map of some commonly involved bare areas is shown in *Figure 10*. Note that the metacarpal heads are involved early and extensively, as well as the PIP joint of the index and middle fingers, the so-called "big 4" joints in rheumatoid arthritis.

Compressive erosions result from muscular forces acting on degraded cartilage and demineralized bone. The result is that the bone ends are compressed, splayed, or even invaginated into one another. This adds to instability and contributes to subluxation.

Superficial surface resorption of subperiosteal cortex occurs and may be present without true joint involvement. Its distribution in areas in which tendons attach leads to the suspicion that tenosynovitis may be responsible. Surface resorption occurs frequently on the dorsal first metacarpal (extensor policis longus), and on the proximal phalanx of the thumb, where the flexor pollicis brevis and adductor pollicis tendons insert. The cortex in these areas appears thinner and the cortical margin is frayed. Linear periosteal bone apposition may also occur here, but these changes are often very subtle. Periosteal new bone formation is more common in the childhood form of the disease.

Pseudocyst formation probably occurs when pannus penetrates subchondral cortex which has undergone necrosis. They may appear to be unconnected to the bone, but oblique views generally demonstrate communication through a small defect. Secondary osteoarthritis may occur with rheumatoid arthritis in later stages, but it does not totally obscure the primary features of the original disease. Fibrous or bony ankylosis may occur late, and involves intracarpal, carpometacarpal, and intermetacarpal joints with relative sparing of MP, PIP, and especially of the DIP joints.

Changes in the foot and other parts of the skeleton tend to parallel those observed in the hand. For example, in the foot, soft tissue swelling may occur involving the Achilles tendon. Later, erosions of the calcaneus are observed at the insertion of this ten-

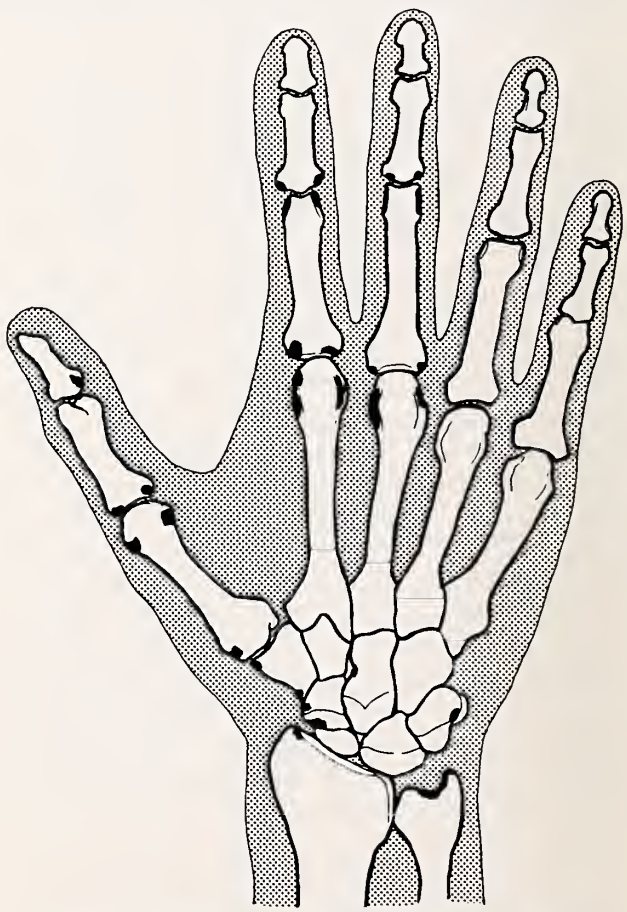

Figure 10. Modified from Ref. 23, W. Martel *et al.*

don, and also at the insertion of the plantar aponeurosis.[25] Thus, findings in any location are entirely analagous to those discussed, following logically from a knowledge of the pathogenesis and resultant anatomic alterations. Still, the hands are the earliest and most sensitive indication of rheumatoid arthritis but changes may be subtle, so that paired hand films should always be taken for comparison when rheumatoid arthritis is suspected *(Figures 11-14)*.

Juvenile Rheumatoid Arthritis

The juvenile form of rheumatoid arthritis will be approached by comparison to the adult form of the disease. The pathologic process is basically the same as in adults.[26] Even so, several interesting differences exist clinically manifesting themselves in the fulminant juvenile form of the disease (Still's disease), as visceral and constitutional changes, even more striking than in the adult form. For example, pericarditis, pleuritis, splenomegaly, lymphadenopathy, micrognathia, and other profound growth disturbances are rather common findings. The rheumatoid factor is present in only 21.7 per cent,[26] and rheumatoid nodules are likewise less common, but skin rashes are much more common in juvenile rheumatoid arthritis.

Distribution of affected joints is also different in juvenile rheumatoid arthritis, with the knee, ankle, and wrist affected most often. These joints correspond with the sites of most rapid bone growth, and are also affected most often in scurvy, rickets, and leukemia. The hand is often not initially involved, but usually becomes involved during the course of the disease. Other common sites of involvement are the elbow, hip, foot, shoulder, cervical spine, and less often the sacroiliac and sternoclavicular joints.[26]

Juvenile rheumatoid arthritis also differs from the adult form in its roentgen patterns. Cartilage destruction and bone erosion are late features of the disease, often occurring after two or more years. Band-like metaphyseal rarefaction exactly simulating that seen in childhood leukemia may be seen. This is postulated to represent a depression of endochondral bone formation resulting from severe systemic illness. Chronic inflammatory hyperemia may also contribute to this condition, similarly as in the adult. The bands of rarefaction in active arthritis are always found in proximal long bones and may be associated with growth arrest lines.

Periosteal bone apposition occurs often in the small bones of the hand and wrist, and adjacent to involved joints. This is a reflection of the ease with which the periosteum of children may be stimulated. Soft tissue calcification infrequently occurs and may

Figure 11. The hands in a case of rheumatoid arthritis. Note soft tissue swelling and multiple erosions.

Figure 12. Rheumatoid arthritis. Again note soft tissue swelling, mouse-bite erosions, uniform joint space narrowing, and subluxations.

represent calcified ligaments or calcified foci of muscular necrosis.

Compression fractures of the spine and epiphyses occur rather often, but are usually seen in patients treated with steroids who have developed secondary osteoporosis. Subluxations are common and may develop without significant bone erosion. Acetabular demineralization from chronic inflammation and weight bearing causes protrusio acetabuli in some patients. Ankylosis occurs frequently and in most cases affects the wrists and neck.

Growth disturbance represents one of the most striking features of the disease. Growth inhibition may result from several factors; the chronic systemic nature of the disease undoubtedly contributes, as well as local factors such as disuse, hyperemia, neurogenic influences, and steroid therapy. These manifest themselves anatomically and roentgenographically as generalized demineralization, reduction of diameter of the shafts of long bones, and epiphyseal overgrowth. Less commonly, retarded epiphyseal maturation occurs. Bradydactylia from premature epiphyseal fusion is a common finding. Inhibition of mandibular growth occurs since the condylar growth center (unlike the epiphyses of long bones) lays down bone by appositional growth. This area is particularly susceptible to injury, since the joint cavity consists of a fibrous layer in place of a cartilaginous barrier. The resultant deformity, consisting of a shortened mandible, is called micrognathia (or "bird-beak jaw").

Spondylitis is not an unusual finding in the cervical spine and manifests itself most commonly by ankylosis of the apophyseal joints of the vertebral column, or by subluxations. Subluxation is most prominent at the atlantoaxial joint (as in adults), and apophyseal ankylosis predominates in the upper half of the cervical spine. Paraspinal ossification is conspicuously absent, and sacroiliac joints are infrequently involved. These findings are in opposition to those in adult ankylosing spondylitis which will be discussed later.

In summary, juvenile rheumatoid arthritis is a fascinating entity having many similarities to but also many differences from the adult disease. Presumably, the same basic pathogenetic mechanism operative in adult rheumatoid disease is modified in the juvenile form of the disease by growing tissues. The hallmark of the full-blown disease appears to be severe constitutional and visceral reactions, as well as involvement of rapidly growing joints, resulting in growth disturbances. Cartilage and bone are less often destroyed, but subluxations, flexion contractures, and ankylosis appear even in its absence. Also,

Figure 13. Rheumatoid arthritis. The fine definition of cortical bone on the head of the right second metacarpal has been lost.

juvenile rheumatoid arthritis may present as monoarticular, oligoarthritis (involving only a few joints), or as polyarthritis. The clinical, radiologic, and prognostic features of each of these differ among themselves, but the pathogenesis and progression are common to all *(Figures 15-18)*.

Psoriatic Arthritis

Another condition having a striking similarity to rheumatoid arthritis in its pathologic appearance is psoriatic arthritis. On this basis, one may postulate similar mechanisms of tissue injury.[20] In support of this, it has been shown that psoriasis and rheumatic complaints may both be preceded by a streptococcal infection in children, again suggesting an immune basis for injury.

Psoriasis often involves the soles, palms, and nail beds. The incidence of psoriatic arthritis varies widely, but is generally believed to be present in about 12 to 15 per cent of the people with psoriasis. The psoriasis frequently precedes the arthritic component by several years, and when joints become involved, there is often an acute extension of the cutaneous changes. Psoriatic arthritis almost always involves the hands and, unlike rheumatoid arthritis, it frequently affects the DIP joints. Knees, feet, and ankles are the next most-common sites of involvement, followed by elbows, shoulders, hips, spine, and occasionally the sacroiliac joints.[27]

Radiologic features are somewhat similar to rheumatoid disease in that osteoporosis, cartilage loss, articular erosion, cysts, subluxations, and ankylosis occur in both diseases, but in lower frequency in the psoriatic variety. Changes occur over a longer period of time and, in general, are less severe than in rheumatoid arthritis. Features which are regarded as characteristic of psoriatic arthritis have been described above. Marginal erosions at the edge of articular cartilage, irregular shaft destruction with marked periosteal reaction, as well as ankylosis, "melting" ("pencil-sharpening") away of bone, and new bony nodules near diseased joints have been notable findings. Other observations include a "mushroom" appearance of metacarpo-phalangeal or metatarso-phalangeal joints, with irregular expansion of the bases of the phalanges accommodating metacarpal or metatarsal heads which have become tapered or pointed. Analogous changes occur in terminal phalanges, giving them the appearance of an inverted golf tee. The tips of terminal phalanges often appear eroded giving the appearance, especially in the great toe, of being whittled down. It is of interest that these changes are often related topographically to the nails involved.[28] DIP joints are much

Figure 14. Rheumatoid arthritis. Extensive involvement, with marked changes of joint narrowing and destruction, subluxation, and osteoporosis.

more often involved in this condition than in rheumatoid arthritis (52% vs 11% in one series), a point often useful in differentiating the two diseases. Lack of osteoporosis despite bone destruction may be seen and may help in establishing the diagnosis. Sacroiliac disease and spondylitis are often unilateral and rather atypical of true ankylosing spondylitis *(Figures 19, 20).*

Anyklosing Spondylitis

As in juvenile rheumatoid arthritis and psoriatic arthritis, ankylosing spondylitis is approached by comparison with patterns observed with rheumatoid arthritis. Systemic manifestations of the latter involving the lungs, lymph nodes, skin, and arteries are seen with much lower frequency in ankylosing spondylitis, while heart involvement is more common (5-15%). Furthermore, rheumatoid factor may be demonstrated in only 10 per cent of these patients. Males are affected nine times more often than females. The response to medication is different, as are distributions of deformities.

Ankylosing spondylitis tends to involve axial joints, including the sacroiliac, symphysis pubis, ischial tuberosities, manubriosternal and acromioclavicular joints.[29] Involvement in the above areas is unusual in rheumatoid arthritis. Peripheral joint involvement *e.g.*, hands, wrists, and feet, on the other hand, are very commonly seen in rheumatoid arthritis, while observed in only 10 to 30 per cent of patients with ankylosing spondylitis. Shoulders, hips, knees, and ankles are affected in both diseases.

The radiologic appearances of joints most often diseased in ankylosing spondylitis are now appropriate for discussion. The sacroiliac joints are almost invariably affected and the diagnosis is questionable without it. This will be thoroughly considered. A background of normal anatomy peculiar to this joint is an important preface. The upper third of the joint is fibrous, while the lower two thirds are cartilaginous. The synovial cavity is located anteriorly in the lower third of the joint.[31, 32] One must also realize that normally, before the age of seventeen, the subarticular cortex is not well defined, the joint space is wide, and the margins of the joint appear "vignetted."[31] Between the ages of seventeen and twenty, the joint assumes its adult appearance.

The earliest changes of ankylosing spondylitis seen in this joint include a patchy loss of subarticular cortex due to small juxta-articular areas of erosion. The vertebral angle of the ilium may also assume a ragged appearance.[30, 31] These radiologic

Figure 15. Juvenile rheumatoid arthritis. Note bridging of shoulder joint with lack of changes of bone erosion. A lucent metaphyseal band may also be observed.

changes may lag one to three years behind symptoms and may be unilateral initially, but after two to five years they become bilateral. Irregular widening of the joint space occurs, followed by reactive bone production in the adjacent ilium, giving the characteristic mottled appearance of well-established disease. As in rheumatoid arthritis, the erosive and invading pannus serves as a bridge for fibrosis and the eventual bony ankylosis. After ankylosis, the sclerosis and pain disappear. Generalized osteoporosis may be conspicuously absent, but may be found adjacent to diseased joints in some cases.[31]

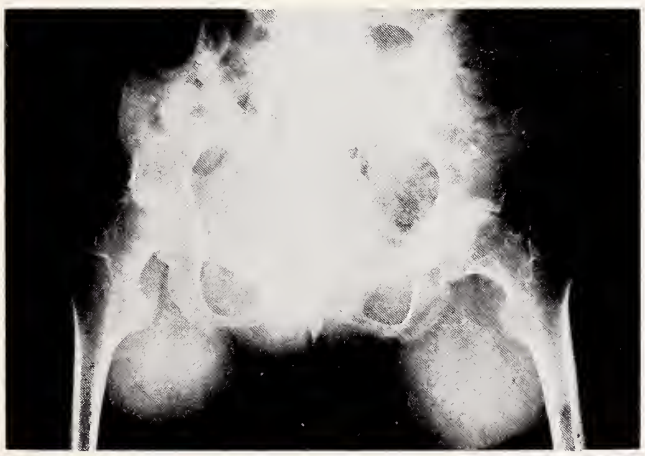

Figure 16. Juvenile rheumatoid arthritis, pelvis. Note uniform joint space narrowing of the hips, and overconstruction of the diaphyses of the femurs as well as the pubic bones.

Figure 17. Juvenile rheumatoid arthritis, knee. Note the ankylosis, demineralization, and thin, overconstricted long bones without convincing evidence of erosion.

The vertebral bodies often have characteristic alterations, demonstrated to best advantage by lateral roentgenograms. A distinct sharpening and loss of concavity give these structures a distinctive square appearance. This represents calcification of the anterior common ligament, and progression of this phenomenon results in the development of the classical bamboo spine.

The costotransverse joints demonstrate the same sort of irregular erosions and local osteoporosis. As in the preceding examples, ankylosis occurs late.

An appreciation of the concept of the hyperplastic, invasive pannus is once again a useful tool for understanding pathogenetic mechanisms leading to erosions, fibrosis, periarticular inflammation, and ankylosis, analogous to rheumatoid arthritis even

Figure 18. Same knee as in *Figure 17*, AP view. Deformity in the metaphyseal region of the tibia and marked reduction in size of the shaft of the fibula all reflect severe systemic illness.

though ankylosing spondylitis is now considered a distinct entity and not just a spinal variant of rheumatoid arthritis *(Figures 21-23)*.

Degenerative Arthritis

Osteoarthritis (Osteoarthrosis)

Returning to our basic understanding of the anatomy of joints and the microanatomical structure of cartilage, we are rewarded to find that not only acute injury, but also chronic wear-and-tear injury can be understood and explained in terms of the same components being subjected to a different type of injury.

Pathologically, osteoarthritis emerges as a unique disease entity. The synovial membranes are essentially normal in cases without gross cartilage alterations.[32] Occasionally, papillary projections of the synovia occur, but no pannus is present. The cartilage undergoes fibrillation, degeneration, and some areas of regeneration histologically. Subchondral bone is thickened and sclerotic, apparently due to either compression or new bone formation. Marrow spaces are sometimes fibrous, and contain cysts and islands of cartilage. Exostosis, or projections of bone outward from the edge of a joint surface, result presumably from pressure secondary to flattening of the articular surfaces. A sequence of events based on the pathology involved may now be constructed.

Knowing that osteoarthritis is present in virtually all persons over forty, one can reasonably deduce that the injury is the inevitable consequence of joint wear over the years.[2] The initial alteration is classically thought of as degeneration of the cartilage manifested by fissuring, thinning, fibrillation, microfractures, pitting, and separation of small fragments.[2, 32] Studies have been done on cartilage from patients of different ages which indicate that older or fibrillar cartilage contains a higher collagen-chondroitin sulfate ratio.[33] This, most likely, is an expression of the tendency for chondroitin sulfate to be more vulnerable to degeneration than is collagen. The ground substance, having lost its stability, allows collagen fibrils to be exposed, resulting in fibrillation. As a result of cartilage disruption, the underlying bone is secondarily subjected to abnormal daily stresses. This results in compression of subchondral bone and new bone formation in an attempt to repair damage, fibrosis, and other changes in the marrow. Examination of subchondral bone reveals new bone proliferation along the surfaces of the old bone and ossification of cartilage islands, presumably representing an attempt to repair or strengthen areas subjected to increased pressure.[32] Exostosis may represent either compression and displacement of bone, or new bone proliferation occurring in response to a similar mechanism.

Secondary osteoarthritis involves weight bearing joints, especially the hip, knees, and lumbar spine. Primary osteoarthritis (genetic type), often seen in postmenopausal women, affects the smaller finger joints, especially the DIP and occasionally the PIP.

The appearance of osteoarthritis on roentgenograms follows from an understanding of its pathogenesis. One may observe irregular narrowing of the joint space due to cartilage disruption and loss. Eburnation or sclerosis of subchondral bone occurs next and is often readily identified. Cysts bounded by a dense wall of sclerosis occur most characteristically in the hip. These cysts may communicate with the interior of the joint. When joint capsule and ligament relaxation are superimposed upon damaged articular surfaces, subluxations may be seen. Spurring or osteophyte formation is usually conspicuous and may even fragment to form loose particles within the joint. More often, these bodies represent particles of cartilage which have been sep-

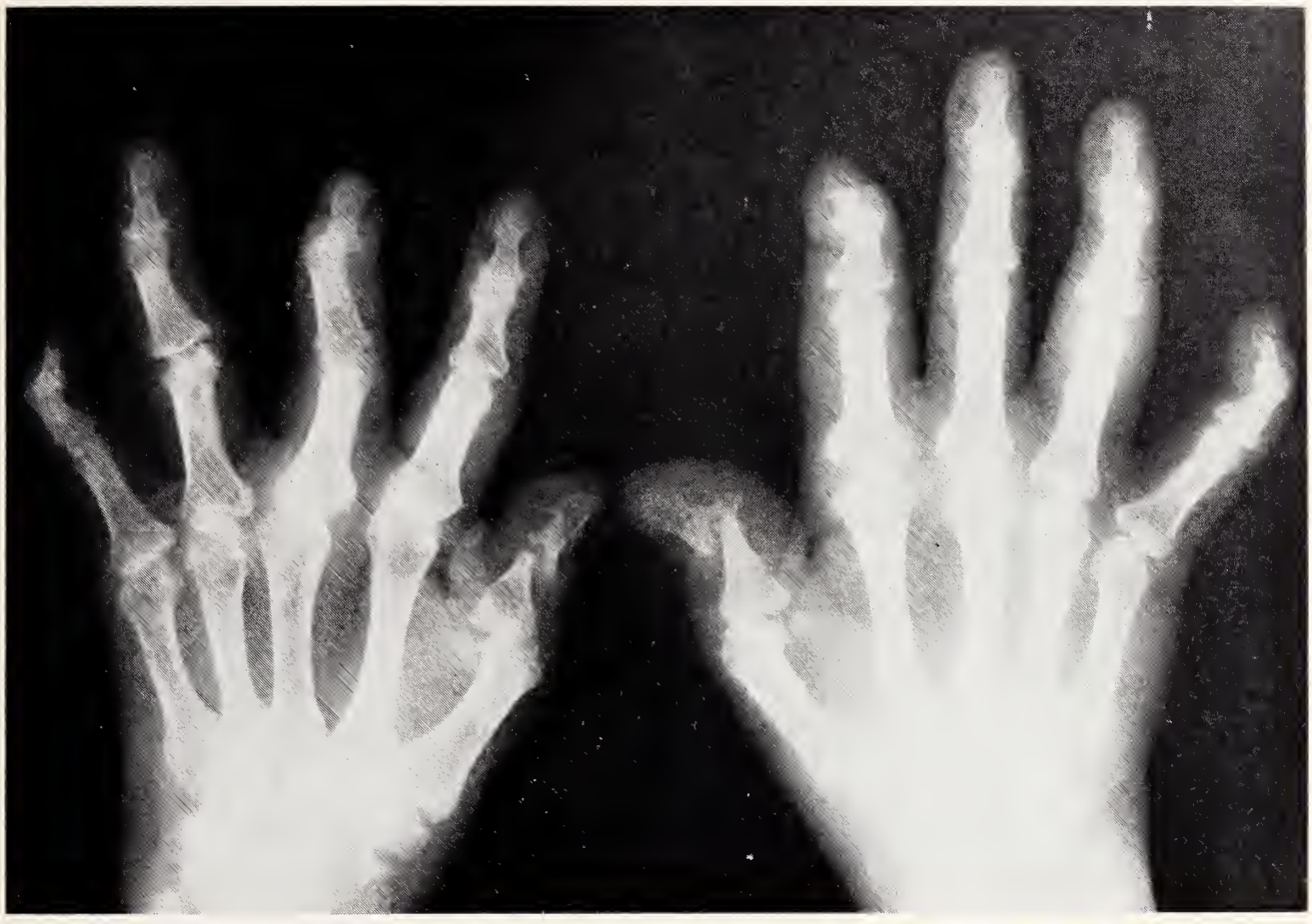

Figure 19. Psoriatic arthritis. Note the difference in distribution from RA with primarily DIP joint involvement.

arated and calcified free within the joint space (joint mice). The knee seems to be the favored site for joint mice.[24] In primary osteoarthritis, the DIP joints of the hands have a particularly characteristic appearance. Marginal spurs form on the bases of the distal phalanges. These enlarge, becoming visible and palpable, and are called Heberden's nodes. Unlike in rheumatoid arthritis, marginal erosions and demineralization do not occur in osteoarthritis. This pattern of distribution may develop in younger individuals. It is not necessarily related to osteoarthritis elsewhere in the skeleton, and it has a hereditary factor.[24] Similar spurs may form on PIP as Bouchard's nodes. Most people over 50 years of age have x-ray changes of osteoarthritis, but few have symptoms. Here, x-ray changes do not necessarily imply or correlate with clinical symptoms *(Figure 24)*.

Neurotrophic Arthritis (Charcot's Joint)

A unique and rapidly progressive form of osteoarthritis is observed in certain types of nerve injury or degeneration where joint pain perception is lowered. The disease entities which have been implicated in neurotrophic arthritis, or Charcot's joint, are the following: tabes dorsalis, diabetes mellitus, syringomyelia, exogenous injection of steroid medication (pseudo-Charcot's joint), traumatic injury to the spinal cord or peripheral nerves, toxic neuritis, tuberculosis, multiple sclerosis, pernicious anemia, cerebral hemorrhage, congenital malformation of the spinal cord, poliomyelitis, amyotrophic lateral sclerosis, congenital insensitivity to pain, leprosy, and yaws.[7, 35] Although tabes dorsalis was the classical disease associated with Charcot's joints, diabetic neuropathy is now the most frequent cause.[34]

The pathologic alterations which occur are thought to result from repeated subclinical traumata in a relatively insensitive joint.[35] This is analogous to the wear-and-tear which produces osteoarthritis; however, the onset is more acute, the course of the disease is more rapidly progressive, and the damage is much more extensive.

Several features in the pathogenesis are noteworthy. Acute and chronic trauma causes joint effusion and often bleeding, relaxation of ligaments, and erosion of cartilage. Microscopically, the cartilage is lost in some areas, and strikingly abnormal proliferation of chondrocytes contribute to the formation of cartilage islands. With the destruction of articular cartilage, underlying bone is then exposed and eroded. Large crevices and defects are found in the spongiosa. This injury stimulates the bone to resume endochondral ossification. The provisional

Figure 20. Psoriatic arthritis. Generally, the joints involved correspond topographically to the areas of skin and nails affected by psoriasis.

zone of calcification is extensively revived, with cartilage production, calcification, and penetration of vascular marrow components into this zone.[35] The

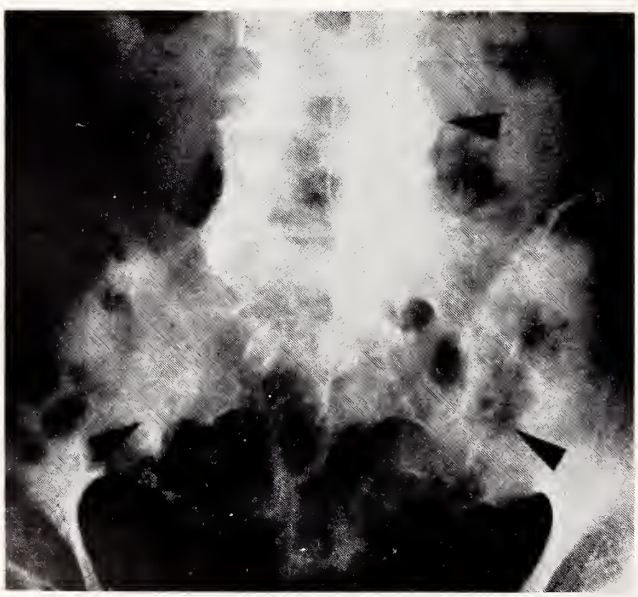

Figure 21. Ankylosing spondylitis. Intestinal gas is seen overlying the left sacroiliac joint and should not be confused with bone lysis. Calcification of the ligamentous structures surrounding the lower lumbar spine has given the characteristic bamboo spine.

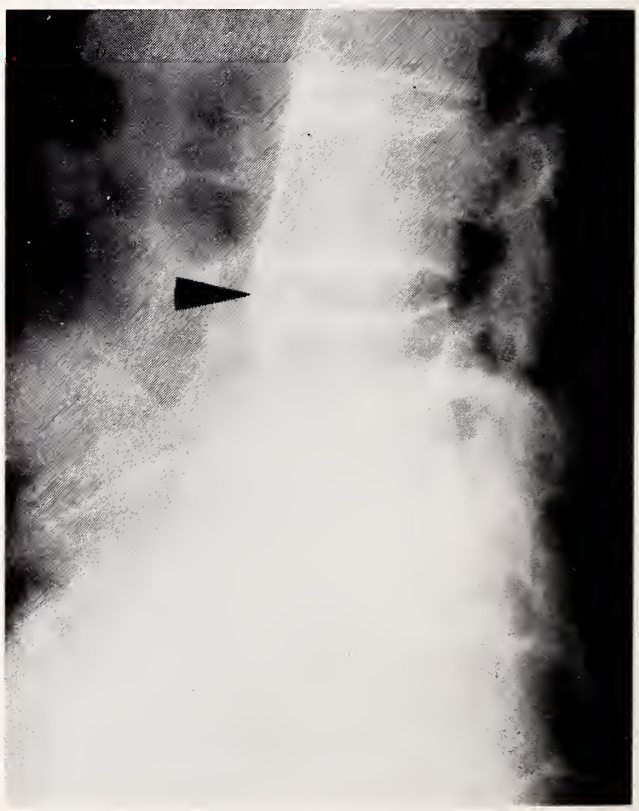

Figure 22. Ankylosing spondylitis, lateral view. Note calcification of anterior longitudinal ligament.

Figure 23. Ankylosing spondylitis. Ankylosis of the sacroiliac joints, bamboo spine, and degenerative hip disease can be observed.

Figure 24. Degenerative arthritis. Spurs do not form true bridges as in ankylosing spondylitis.

resumption of bone production in the face of continuous trauma produces the sclerotic or eburnated bone which is observed under each cartilaginous defect.

Overgrowth of bone also occurs at the articular margins, exactly analogous to that observed in osteoarthritis. Fragmentation, or detritus, is often apparent, consisting of small bone and cartilage particles which have resulted from fractures occurring in the damaged joint. The result of continuous trauma, ligamentous relaxation and cartilage destruction, superimposed on a disparate reparative attempt in the form of new bone production, gives a particularly characteristic picture. Subluxations of the most marked degree are observed in this disease.

It is not surprising to find that the above alterations usually occur in weight-bearing joints. In fact, 75 per cent of joints so affected are in the hip, knee, or ankle. Neurotrophic arthropathy occurring in the upper extremities is most often due to syringomyelia.[24] The spine may also be involved, resulting in marked scoliosis or kyphosis. Tabes most often affects the lumbar spine, while syringomyelia manifests its changes in the thoracic spine.

In addition to the distribution of lesions, specific findings are observed on the roentgenograms, all of which follow directly from the pathogenesis and anatomic alterations. Some early changes include joint effusion, cartilage erosion, compression fractures of bone, and bony detritus or fragmentation. As reparative processes ensue, eburnation and sclerosis become more pronounced, and often massive degenerative spurs or osteophytes appear. As indicated above, subluxations are often striking.

Occasionally, the adjacent bony structures appear atrophic and demineralized, rather than sclerotic. This may represent a stage in the progression of the disease where hyperemia and osteoporosis predominate, presumably before new bone formation begins. It occurs when the destructive process comes about especially rapidly. Charcot's joint with adjacent bony demineralization has been observed in patients receiving steroids (especially intra-articularly). The anti-inflammatory properties of the drugs tend to render joints less sensitive to pain from continuous trauma. Coupled with failure of such bone to form structurally adequate new bone, and the tendency of steroids to cause osteoporosis, the changes can be explained and anticipated *(Figures 25-28)*.

Ochronosis

Another rare variation on the theme of degenerative joint disease is caused by the presence of oxidized homogentisic acid polymers within cartilaginous structures. This condition is known as ochronosis, a term referring to brownish-black cartilage dis-

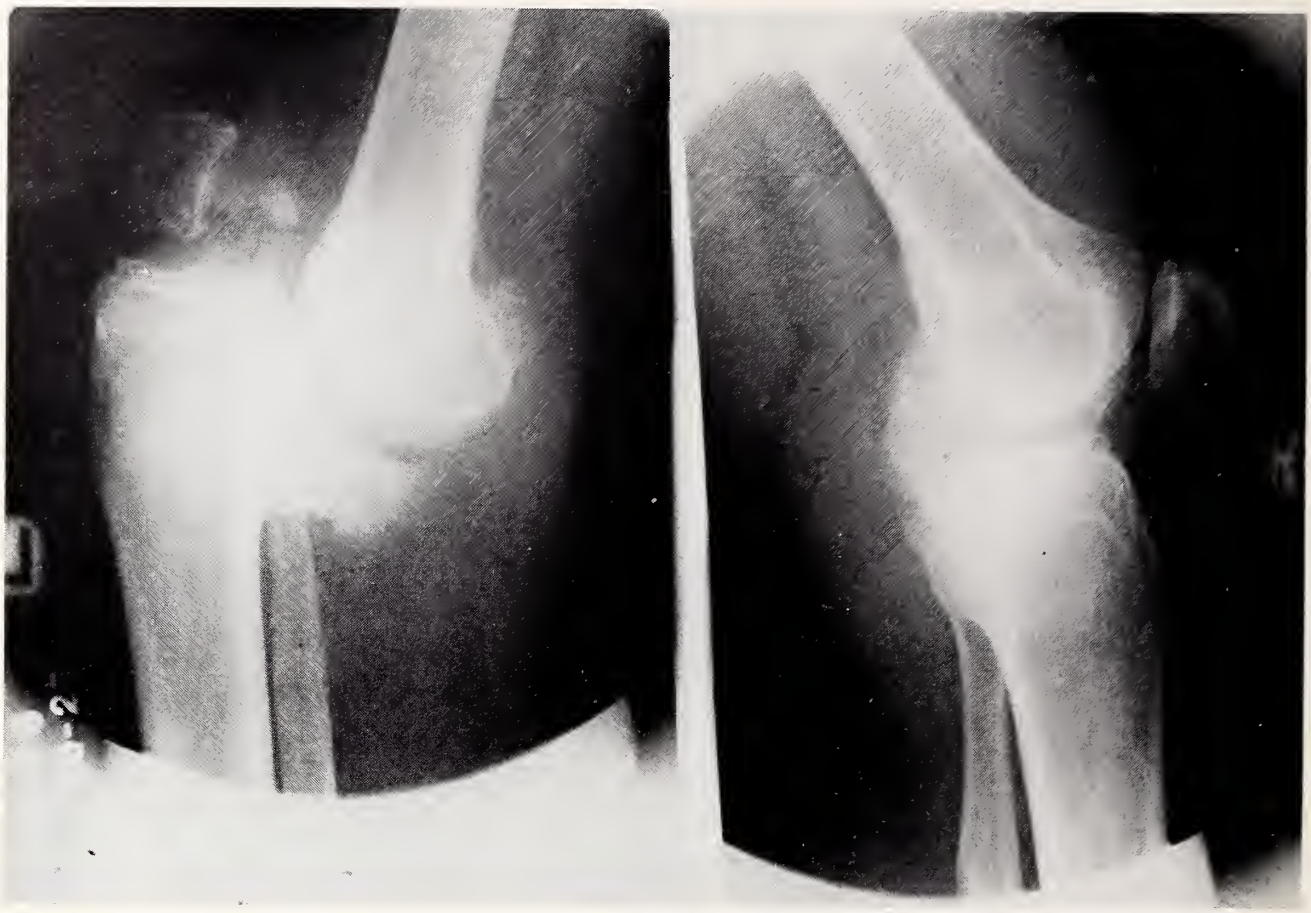

Figure 25. Charcot's joint, knee. The changes are those of marked subluxation, fragmentation (detritus) and eburnation, or sclerosis of subchondral bone.

coloration occurring in joints, the pinna of the ear, sclerae, and cardiac valves. The term, alkaptonuria, refers to the presence of this reducing substance in urine, which causes it to turn dark on standing.

This metabolic defect occurs with an incidence of about one per one million population. It is mendelian recessive and is present from birth.[36] Joint involvement (ochronotic arthropathy) occurs in 30 per cent of persons with the metabolic defect, and is characterized by stiffness and pain usually apparent by age 35 in men, and 40 or 45 in women. Large joints are involved most extensively (knee 64%, hip 35%), while smaller joints are spared.[36] The basic defect producing ochronosis is the absence of homogentisic acid oxidase, an enzyme normally present in the liver and kidneys. Since the enzyme accomplishes the degradation of homogentisic acid, absence of the former results in accumulation of the latter.

In vitro experiments by Milch[37] have shown that oxidation polymers of homogentisic acid appear to be irreversibly bound to collagen by a reaction independent of hydrogen ion concentration. This results in cross-linking and displacement of water molecules from between the collagen structures. The affinity of cartilage for this substance has again been shown by incubation of various tissues with oxidized homogentisic acid. Pigmentation of cartilage was noted in as little as 24 hours.[38] Electron microscopic examination of collagen fibers showed an increase in diameter of the fibers with ragged edges and loss of normal striations. Irregular amorphous structures have also been observed arising from the fibrils.[38]

Cartilage which has been exposed to excessive homogentisic acid discolors, becomes necrotic and brittle. This may be the direct effect of the pigment on cartilage or of its effect on the mechanical or metabolic integrity of chondrocytes.[38] Minimal trauma can then cause fragments to break off, which act as abrasive particles to cause further joint degeneration. Fragments displaced into the synovial tissue cause a metaplastic reaction of the synovium. The events described cause loss of integrity and calcification primarily of cartilaginous joint components accompanied by a tendency toward disproportional osteoarthritis. Roentgenograms may demonstrate this process eloquently and with relative certainty.

Calcification of intervertebral discs is the most distinctive finding.[37] The spine may also demonstrate eburnation of adjacent bone, the vacuum disc phenomenon, or even fusion of the joint space. In other joints, narrowing of the joint spaces and bony overgrowth demonstrate its similarity to osteoarthritis. Osteoporosis is not usually a feature. Calcification

Figure 26. Charcot's joint, knee. Again note eburnation, joint space narrowing, and fragmentation, all secondary to decreased sensation in this knee.

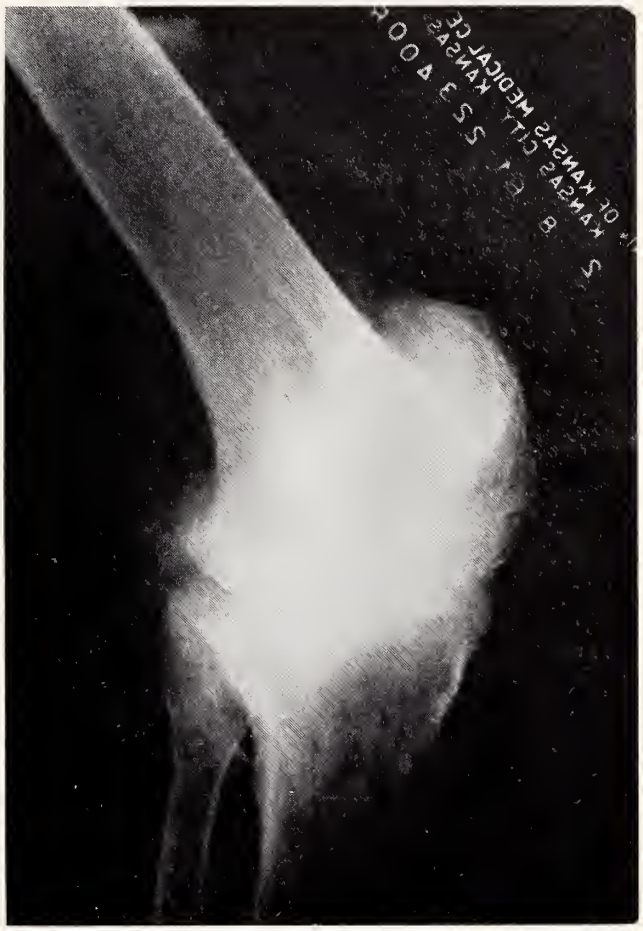

Figure 27. Charcot's joint, knee. The changes previously described are again demonstrated. In this case, the etiology was syphillis.

in other cartilaginous tissues may be predicted, and is indeed observed. The pinna of the ear seems to be a predilected site for this ectopic calcification *(Figure 29)*.

Chondrocalcinosis (Pseudogout)

The final disease entity to be considered here is pseudogout, which also manifests itself roentgenographically by calcifications within articular cartilage (chondrocalcinosis). The pseudogout syndrome has a striking male sex predilection of 20:1, affecting patients in the 40 to 80 years-age-range most often, with a mean age in the late 60s.[39, 40] The large joints, especially the knee, are classically involved, with the wrists, symphysis pubis, hip, and shoulder also as common sites. The tendency toward bilateral distribution is especially noteworthy.

Clinically, the manifestations vary from low grade to acute arthritis, resembling acute gout. Onset of symptoms is further reminiscent of gout developing in only 24 to 48 hours, and lasting from a few days to a few weeks. Like true gout, this entity tends to be familial and is often associated with diabetes mellitus, hypertension, and atherosclerosis. The pathogenesis of chondrocalcinosis has not been well delineated. Whether degeneration of cartilage followed by calcification occurs, or whether a defect in calcification causes secondary degeneration has not been satisfactorily established. The crystals have been proven by x-ray diffraction studies to be calcium pyrophosphate.[41] In this regard, the disease, like gout, has been simulated by intra-articular injection of calcium pyrophosphate crystals in dogs and man.

Examination of the crystals in the cartilage or synovial fluid reveals their shape to be in the form of rods, barrels, and rhomboids.[39, 41] In chronic effusions with low cell counts, these crystals tend to be rhomboid or rectangular in shape and are located extracellularly. In contrast, acute effusions with high cell count are characterized by rod or barrel shaped crystals localized intracellularly.[41] Crystal dynamics, therefore, seem to contribute to the pathogenesis of pseudogout, just as they do with gout. The crystals, by compensated polarized light microscopy, show a weakly positive birefringent pattern in contrast to urate crystals which display strong negative birefringence, a pathognomonic diagnostic feature. Although the deposition phenomenon is not understood, the presence of calcium pyrophosphate

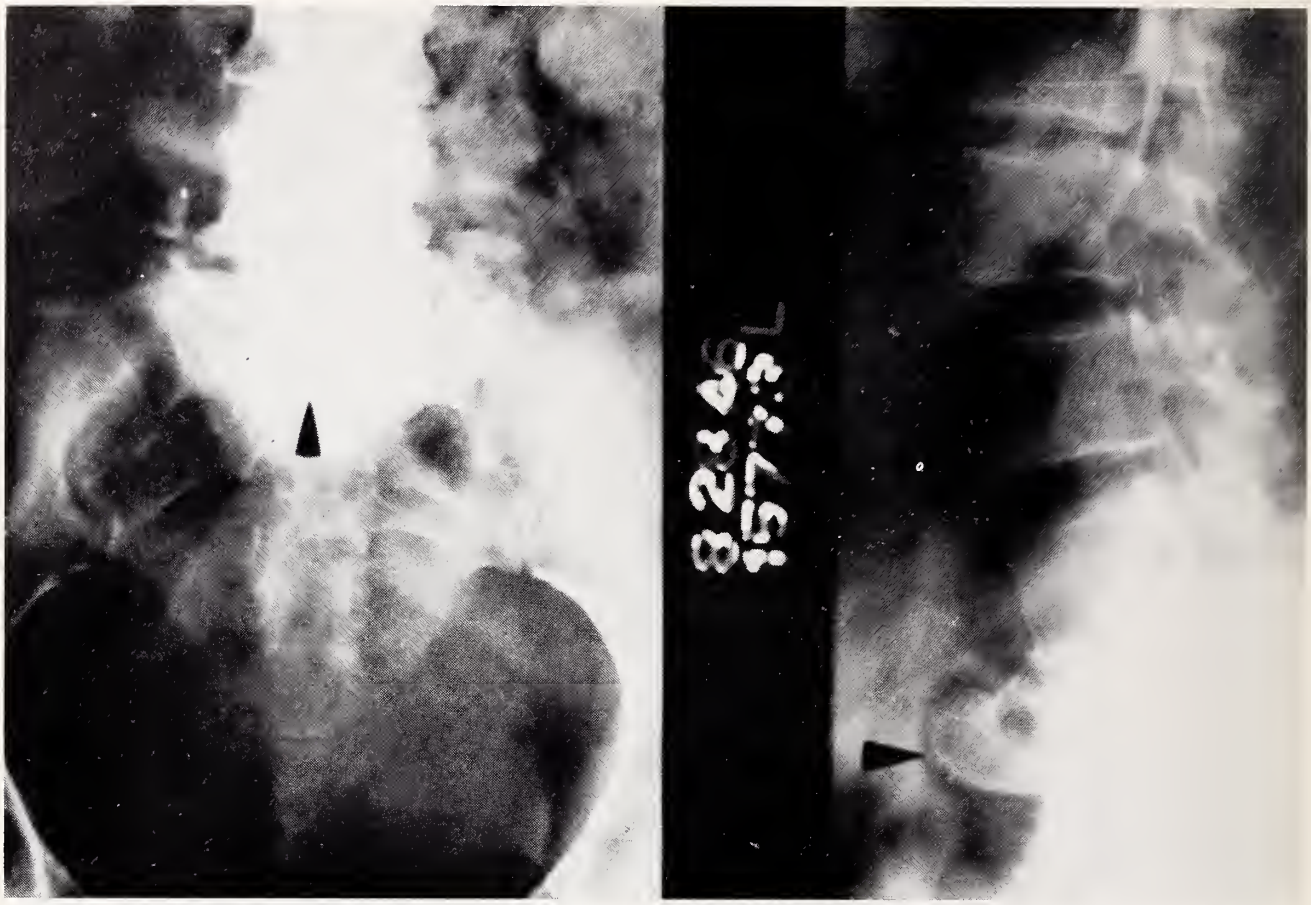

Figure 28. Charcot's joint, spine. Giant osteophyte formation, again resulting from attempted repair of continuously damaged bone and joint surfaces.

crystals (or any other insoluble crystal of similar size) incites an inflammatory reaction, which causes the clinical symptoms.

In pseudogout, the cartilage is calcified in a linear manner particularly characteristic of this disease, making this form of chondrocalcinosis quite distinctive in roentgenograms. Since calcium deposits are laid down in a radial fashion, a nonlinear Y shaped density within the knee joint space represents calcified meniscus, rather than the chondrocalcinosis of pseudogout. Linear densities associated with pseudogout are also observed in the joints of the wrist, hip, shoulder, symphysis pubis, elbow, ankle and hand, as well as the radioulnar joint and annulus fibrosis.[39, 40]

Calcification of the articular capsule is also reported to occur in pseudogout, but is seen infrequently. Again, the disease tends to involve joints in a bilateral fashion, but not necessarily both at the same time. The diagnosis is not a difficult one to make radiologically, using the above criteria when chondrocalcinosis is present *(Figure 30)*.

Summary

The emphasis in this study, as stated initially, is based on an understanding of normal anatomy and physiology of joints, as well as alterations which may occur in these joints to cause pathologic change. By relating these changes to basic biochemical and mechanical joint structure, it is hoped that a more sound framework for understanding can be built, and that the concepts will prove useful in retaining the material presented, as well as aiding in the incorporation of newer information as it presents itself in the future.

Some 70 or 80 other diseases not mentioned may also have joint manifestations. As most of these are not primary or common arthritides, they fall beyond the scope of this paper, but must nevertheless be considered in a differential diagnosis of arthritis. Among others, these include such entities as sarcoidosis, hemophiliac arthropathy, pigmented villonodular synovitis, tumors, loose bodies, traumatic arthritis, periarticular diseases, and hypertrophic pulmonary osteoarthropathy. These are merely mentioned for added completeness and as a stimulus to further consideration of the arthropathies as a challenging but rewarding area of clinical and radiologic study.

Acknowledgement

The author is grateful for assistance received from Sidney Rubin, M.D.; Robert G. Godfrey, M.D.;

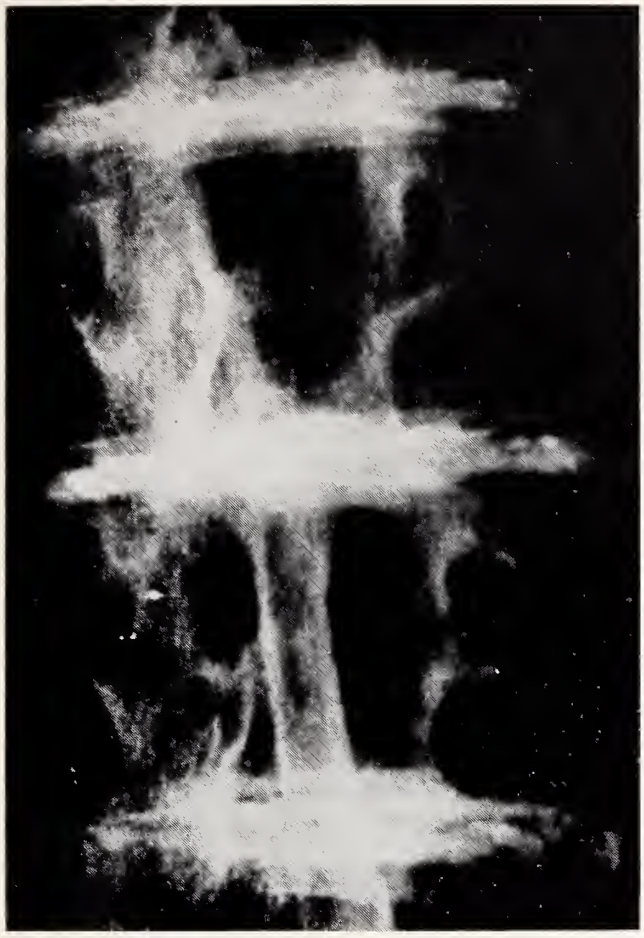

Figure 29. Ochronosis. Note marked calcification of intervertebral discs. (Reprinted from Ref. 42, J. Edeiken and P. J. Hodes.)

Rose Davidson; Norman Martin, M.D.; Mr. Roger Odneal, and Merlene Bishop.

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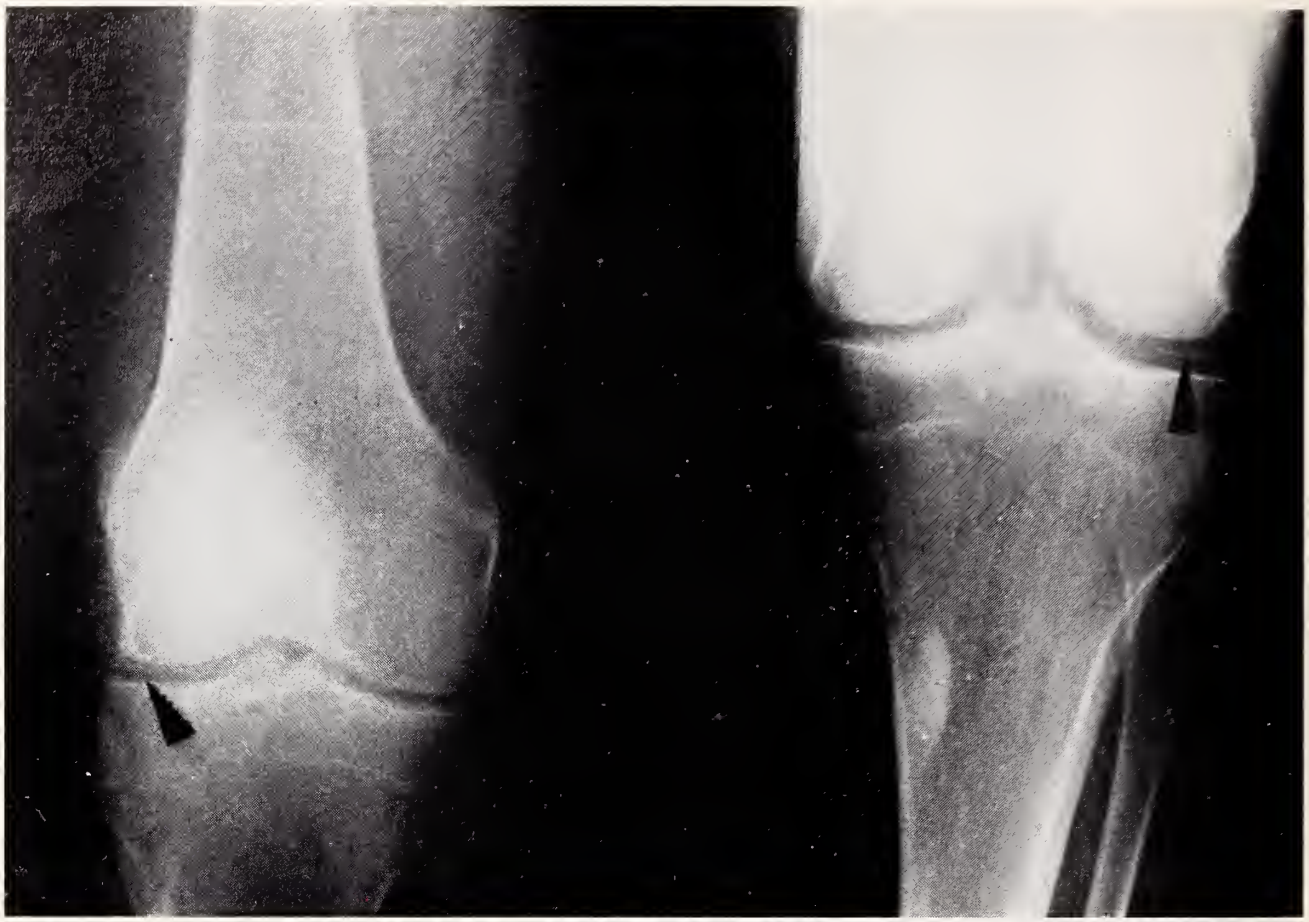

Figure 30. Chondrocalcinosis affecting the knee. Calcification within the articular cartilage is observed. This represents calcium pyrophosphate, and is a roentgen feature of the pseudogout syndrome.

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Occult Melanoma

(Continued from page 499)

Summary

Two cases of occult melanoma metastatic to the small intestine were presented. Although an uncommon lesion, metastatic melanoma should be considered in the differential diagnosis in any patient with symptoms of intestinal hemorrhage, obstruction, or perforation. A careful search for past and present primary skin lesions should be made to exclude this diagnosis.

Acknowledgement

The authors are grateful for the assistance of Alfred Heilbrunn, M.D. and F. E. Cuppage, M.D.

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The President's Message

Dear Doctor:

Here it is, December already. It's time to turn our thoughts away from trying to get your fellows' attention focused on our need for unity.

Christ was a good physician, too! It is alleged, He straightened twisted limbs and relieved tortured minds. There is one instance recorded of His performance of an ancient equivalent of cardiac resuscitation.

You know, if He were alive today, He would probably be harassed for practicing without a license.

A license does not make a doctor—they are made of love by divinities. A license merely finds us unobjectionable to the state, and guarantees our educational attainments.

Well, this is the month of His birth. Oliver and Jim, the faithful girls and I, wish you a very Merry Christmas and all the best for the New Year.

Kenneth L. Graham M D

President

Editorial COMMENT

The Opportunity

At this writing, the political smog is lifting slightly with a welcome though probably transient relief from some of the irritants that fill the air during the bi- and quadrennial convulsions known as elections. The nit-picking, the rumors, the quotations out of context, the accusations and outraged denials, the pointing-with-pride and viewing-with-alarm have abated while everyone pauses to take a breath and assess the damage. The politicians and news oracles have professed dismay at what they call voter apathy. It is, of course, not apathy in the literal sense—without feeling—but rather a diminution of open expression produced by one part uncertainty, one part wariness, and one part cynicism stemming from experience with the accomplishments of the incumbents, which are not all that good, and the promises of the challengers, which will not be recognizable even if they are brought to fruition.

For the past several months, the medical legislation stew has been simmering on the back burner. Word has come from the kitchen that it should be ready for serving up at the next meal—and then be prepared for quite a meal: an entree of national health insurance with side dishes of health care delivery reorganization and payment plans direct from the pressure cooker; to be followed, no doubt, by just desserts.

Heresy though it be, we do not think the physician should have the sole voice in creating the legislative implements which will produce the new system. His professional expertise should be the prime source of information and concept upon which the legislation is based, but the total problem of the provision, development, distribution, and financing of health care compatible with the social structure of the day is too complex to be dictated by any one of the participants, whether social, political, or medical scientist. The highest order of political integrity requires that the political spokesman for the people amalgamate his knowledge, attitudes, and capabilities with the opinions, desires, and objectives of his constituents. In turn, the electorate in a democratic system has the responsibility to work with its representatives in the interests not only of the individual or special group, but the total public structure as well. Thus, the physician who is directly—or indirectly—involved in the production of medical legislation must constantly examine his motives from the seemingly conflicting aspects of self-interest and public interest. Few of us are so altruistic that the two are identical. The democratic philosophy assumes that from this multiplicity of pressures and efforts will emerge the best of all possible worlds. Best or not, the world is, at any given moment, a reflection of the practical result of this activity.

The Kansas physician has an unusual opportunity to participate in the development of medical legislation by virtue of the fact that one of his colleagues not only serves in Congress, but has been active in the preparation of significant elements of this legislation. It is no secret that the official attitude of the organized medical community has been something less than favorable toward the implications of some of these efforts. This constitutes, of course, a maneuvering which is part of the efforts to influence the process along the lines deemed most suitable for the majority in the local scene. It does not preclude a differing of opinion of individual physicians or their personal efforts to make themselves heard. While this physician-congressman holds his seat as a representative of a prescribed geographical area of the state, his medical status opens the way for any physician in any part of the state to be able to communicate on a level impossible with a layman representative. The outcome of his efforts will have nationwide effect and is too important to allow the source of knowledgeable opinion and advice to be restricted to that derived from a limited geographic area.

The presence of a medical colleague in the lawmaking processes offers the physician a more direct and receptive channel for his expressions of opinion, it also alters this direction and reception. A layman would proceed from the standpoint of a layman, interpreting medical problems as a recipient of medical service rather than a purveyor. His interpretation of the medical aspects would be influenced by physician-opinion to the extent, degree, and character of its offering. This would include the expressions of individual physicians—primarily, if not exclusively,

(Continued on page 538)

The Kansas State Board of Health

Legal Basis and Responsibilities

E. D. LYMAN, M.D., M.PH.,* ***Topeka***

THE SAFEGUARDING of life, limb, and property is the foremost function of government, and the responsibility for discharging this function is vested chiefly with police, fire, and health departments. Inaction on the part of a department of health should no more be tolerated than inaction on the part of either of the other two.

The Kansas State Board of Health was founded in 1885, just 16 years after the first state board of health was formed, by Massachusetts, and 24 years before the last, by Texas. The first local boards of health antedated state boards by almost 100 years. Before establishment of local and state boards, authority for health matters remained in the hands of the local and state governing bodies as part of their police power.

The authority and responsibilities of the state board of health cannot really be treated intelligently without discussion of responsibilities and powers of the federal and local governments. Unlike the state, the powers of the federal and local governments are delegated to them from the states and state. The states are sovereign powers with plenary and inherent authority which is designated "police" power, or power full and inherent in the body politic. The word police is derived from the Greek word "polis," meaning city, which in ancient Greece was the unit of government constituting the state and was commonly referred to by later historians as the city-state.

The state constitution of Kansas does not provide for a state board of health, but does authorize the establishment of needed departments and agencies by the state legislature.

Chapter 65 of the Kansas Statutes deals with public health. The Board of Health has certain authorities to be found in other chapters, all of which are made reference to in the budget.

K.S.A. 74-901 provides for the State Board of Health and specifies its memberships and terms of office. It reads as follows:

Article 9— State Board of Health.

74-901. Members; qualifications; appointment; terms; vacancies; powers and duties; rules and regulations; oath; officers; legal and accounting counsel; offices. The state board of health shall consist of eleven (11) members, five (5) of whom shall be licensed in the state of Kansas to practice medicine, one (1) of whom shall be licensed in the state of Kansas to practice pharmacy, one (1) of whom shall be licensed in the state of Kansas to practice dentistry, and one (1) of whom shall be licensed in the state of Kansas to practice veterinary medicine, one (1) of whom shall be a hospital administrator, one (1) of whom shall be a sanitary engineer. The members of said state board of health shall be appointed by the governor by and with the advice and consent of the senate and in making such appointments, the governor shall as far as practicable make his appointments so that the members of said board will be residents of the different parts of the state.

The members of said board shall hold their respective offices for a term of three (3) years and until their successors are appointed and qualified except that the members of the first board shall hold their offices for terms as follows: Three (3) for a term of one (1) year, three (3) for two (2) years and four (4) for three (3) years, and the governor in making the appointments shall designate the term for which each is to serve and except the licensed administrator of a skilled nursing home first appointed shall hold his office for a term of two (2) years; and annually thereafter the governor shall in like manner appoint successors of like character and qualifications to fill the vacancies occurring in said board by reason of the expiration of the terms of service as herein provided.

All the powers, duties, authority and jurisdiction now conferred or imposed by law upon the state board of health are hereby transferred to, imposed and conferred upon the state board of health created by this act. All valid rules and regulations of the state board of health existing on the date this act takes effect and on file in the office of revisor of statutes as provided by law shall constitute and be the rules and regulations of the state board of health created by this act and shall continue in force and effect until revoked, suspended or amended by the state board of health created by this act. In no case shall any member appointed under the provisions of this act serve for more than two (2) terms in succession. Upon the appointment of the persons provided for in this act, the secretary of state shall issue to each of them a certificate of his appointment, and they shall each take and subscribe to the oath prescribed by law for state officers, which shall be filed with the secretary of state; and thereupon said board shall immediately organize by electing one member of the board president.

The president of said board shall have no vote in any matter other than the election of officers unless there is a tie vote, when he shall have the deciding vote. The

* Executive Secretary and Health Director, Kansas State Department of Health.

board shall also elect a secretary and said secretary shall be the executive secretary of said board, but not a member thereof. The secretary shall take and file a like oath to that prescribed for the members of said board.

The board may elect one of its own number secretary, but in such case such election shall create a vacancy in the board, which shall be filled by the governor. It shall be the duty of the governor to fill all vacancies which may occur in the board; and all appointments, whether original or to fill vacancies made during the recess of the legislature, shall be submitted by the governor to the senate at its first session after such appointment is made, for its action; but all lawful actions of the members of the board made before confirmation or rejection shall be valid. The board may employ and fix the compensation of legal and accounting counsel. The executive council shall provide the state board of health with a suitable office at the city of Topeka for the transaction of its business. (K.S.A. 74-901; L. 1967, ch. 434, #25; L. 1970, ch. 265, #6; March 26.)

K.S.A. 65-101, enacted in 1885 and last revised in 1923, outlines the general functions of the Board of Health. It reads as follows:

Article I.—Board of Health, Activities.

Cross References to Related Sections: State board of health, see ch. 74, art. 9.

General Powers and Functions.

65-101. Health supervision, investigations, sanitary inspections, surveys and quarantine; regulations affecting carriers, penalty for violation. The Board of Health shall have general supervision of the health of the citizens of the state, and endeavor to make intelligent and profitable use of the collected records of the causes of sickness and death among the people. They shall make sanitary investigations and inquiry concerning the causes of disease, and especially of epidemics and endemics; the causes of mortality and effects of locality, employments, conditions, food, water supply, habits and other circumstances upon the health of the people. They shall advise officers of government, or other state boards in regard to location, drainage, water supply, disposal of excreta, heating and ventilation of public buildings. They shall make sanitary inspection and survey of such places and localities as they deem advisable; and when they believe there is a probability that any infectious or contagious disease will invade this state from any other state or country, it shall be their duty to take such action and adopt and enforce such rules and regulations as they may, in the exercise of their discretion, deem sufficient in preventing the introduction or spread of such infectious or contagious disease or diseases within this state.

The better to accomplish such objects, they are empowered and directed to establish and strictly maintain quarantine at such places as they may deem proper, and are further empowered to make and enforce any regulations to obstruct and prevent the introduction or spread of infectious or contagious diseases to or within the state. They may establish quarantine ground in some suitable place and establish the quarantine to be observed in such locality, and may there cause to be erected temporary buildings or hospitals, necessary for the medical treatment of any persons who may be kept in quarantine and affected with contagious or infectious disease, for the inspection or disinfection of travelers' baggage, merchandise, and articles in transit through such quarantine grounds or stations; and they may enforce inspections of persons and articles at such stations or grounds, as well as the purification of persons, baggage, and articles, and require the transportation of passengers from said quarantine station.

All companies or individuals operating or controlling railroads, electric railways, coaches, public and private conveyances, in this state, shall obey the rules and regulations when made and published by the state board of health; and any person or owner having charge of any railway train, passenger coach, electric railway or public or private conveyance who shall refuse to obey such rules and regulations, when made and published by the state board of health, shall be guilty of a misdemeanor, and for each offense shall be punished by a fine of not less than fifty nor more than five hundred dollars, or be imprisoned in the county jail not less than ten nor more than sixty days, or both so fined and imprisoned. (L. 1885, ch. 129, #4; L. 1907, ch. 379, #1; March 12; R.S. 1923, 65-101.).

Although conferring broad powers upon the board in the lead sentences, the article soon becomes more restrictive in its emphasis upon infectious and communicable disease. Failure to broaden the charge in order to keep it current, and continuation of the ancient reference to infectious disease, serves to prolong the misconceptions held by the public and professionals alike about the purpose and functions of the State Board of Health.

Periodically its mission, as expressed in the basic law, should be reexamined and redefined in the light of new developments. This is particularly true of a field characterized by such expansion as that of health today. Only by careful examination of scores of health laws, which have been enacted subsequent to the original act, can one secure any idea of the overall mission of the State Board of Health.

The key sentence spelling out the authority of the board is the first sentence, "The Board of Health shall have general supervision of the health of the citizens of the state. . . ."

In order to discharge this and subsequent charges given the board, it has adopted an organizational structure which has been modified from time to time as a result of legislation, funding, and administrative concepts. The present chart indicates that the board is served by six advisory commissions established by statute, and functions through eight major operating divisions. The executive secretary and health director is appointed by and is responsible to the Board of Health for carrying out the programs assigned to

the board, and under the policies and directions set by the board.

The basic mission of the Board of Health, although often overlooked or even purposefully ignored, is the raising of the level of health protection, health service, and health care of all people within its jurisdiction. A great variety of mechanisms are available by which the board can discharge its responsibilities toward meeting this mission. These need not be enumerated other than to say education and public information are by far the major devices available to the board. Legal action, although essential, is not the means by which progress is made, but rather the means by which advances are secured against erosion.

The State Board of Health by legislation is responsible for approximately 50 different health programs whose implementation requires an exceptionally wide range of professional talent. This diversity of programs and professionals make it difficult for the board to secure public understanding and support. Even administrations and legislatures have found the programs difficult to comprehend. Whenever a program cannot be readily grasped because of its magnitude or complexity, it is often abhorred, rejected, and sometimes ridiculed. Herein the single purpose agencies have the advantage over such an agency as the Board of Health. But herein also is the challenge to the State Board of Health.

In carrying out its mission, the board may follow a procedure proved effective wherever and whenever employed in meeting issues. These may be designated as steps, as follows:

1. Define the problem
2. Review various solutions
3. Decide upon a course of action
4. Interpret and support the program to the public, to professionals, and to political groups
5. Evaluate methods and results.

In the process outlined above, the board requires the active participation of public and private individuals and groups. Benefit will result from this process only as the task is undertaken with impartiality, freedom of prejudice, and with realization that public trust is the highest and overriding trust any of us shall ever be called upon to fulfill.

The Board of Health is limited in what it can do by way of direct services for people from a single central headquarters office or even from regional offices, however numerous. Because of this limitation, the state has seen fit to delegate authority for the public's health to its political subdivisions—municipalities and counties.

Each county has a board of health which, in most instances, is the county commissioners. They in turn are charged with appointment of a health officer who, once appointed, may sit as a voting member of the board of health, except on motions concerning his dismissal.

K.S.A. 65-201, which provides for local boards of health and their duties, reads as follows:

Article 2.—Local Boards of Health; Clinics.

Cross References to Related Sections:

County sanitary codes, see ch. 19, art. 37.

65-201. County and city boards; physician as health officer. The county commissioners of the several counties of this state shall act as local boards of health for their respective counties. Each local board thus created shall elect a physician; preference being given to adepts in sanitary science, who shall be ex officio a member of said local board and the health officer of the same. He shall hold his office during the pleasure of the board, but may be removed for just cause at any regular meeting of the same by a majority of the members voting therefor, on which motion he shall not vote.

The local boards of health hereby created shall not supersede or in any way interfere with such boards established by municipal regulations in any of the counties of this state; but all local boards of health of this state, created by this act, or existing by authority of municipal law, shall be governed by the provisions of this act. (L. 1885, ch. 129, #7; March 17; R.S. 1923, 65-201.).

A close working relationship between the state and local boards of health is essential. A major responsibility implied, if not always stated, of the State Board of Health is to support local boards and assist them in developing the competency needed to handle local community health matters at the local level, if at all possible.

Presently, 62 counties provide some type of local health service. By January 1, 1973 at least five, and possibly eight, more counties will have county sanitation services for the first time. When all counties will have established such local health services, the work of the State Board of Health will become considerably more meaningful and effective. Hopefully, future health legislation will take cognizance of this vital community resource for the benefit of the citizens of Kansas.

Although the State Board of Health has the legal responsibility for the health and well-being of the people of the state, and the local boards of health the same for the people at the county level, neither can fulfill the responsibilities by itself. The public sector is heavily dependent upon the private sector in discharging its legal obligations. Therefore, a close relationship is essential and mutually beneficial, and especially so to the people served by both levels of the board of health.

(Continued on next page)

VARIOUS INSTRUMENTS are available which may provide one with insight into the organization and administration of the Kansas State Department of Health. Chief among these are the laws relating to the Board of Health, the Executive Secretary and staff, the organizational chart, staff size and composition, and finally the budget. Perusal of these documents, however careful, can at best provide but a most imperfect understanding of the subject. No real substitute exists for living and breathing the department day after day, month after month, year after year. Too close exposure and involvement of staff members, however, in the daily problems can dull one's perceptions and distort one's perspectives. Board members meeting periodically yet regularly cannot be expected to be as conversant as staff with operational detail, but it is because of this very fact that members of the board can provide an objectivity and perspective invaluable to administration.

The above paper has dealt with the Legal Basis and Responsibilities of the Kansas State Board of Health.

This paper intends to examine the organization and administration of the Department of Health by a cursory review of the basic law portraying the relationship between the board of health and the staff, the organizational chart, the staff, and finally the budget.

The Law

K.S.A. 74-901a through 74-903 sets forth clearly and concisely the organizational lines of authority and administration, exercise of power of the Board of Health through the State Health Officer, prohibition of delegation of the rule-making authority of the board, rules of business, and finally tenure and duties of the secretary, including communications with state and local health departments.

The law reads as follows:

74-901a. *Organizational lines of authority and administration; definitions.* As used in this act: (a) The term "state board of health" means the ten (10) member board established by section 74-901 of the General Statutes Supplement of 1961 and its executive secretary as established therein. (b) The term "state department of health" means the state board of health established by section 74-901 of the General Statutes Supplement of 1961, except for the ten (10) member board and its executive secretary as defined in (a). (L. 1963, ch. 397, sec. 1; June 30.).

74-901b. *Same; state health officer; rules and regulations of board.* The executive secretary of the state board of health shall be the state health officer. The state department of health shall be under the supervision and control of the state health officer, subject to the orders, rules and regulations of the state board of health. (L. 1963, ch. 397, sec. 2; June 30.).

74-901c. *Same; exercise of powers by state health officer.* The powers and authorities of the state board of health shall be exercised by and through the state health officer and the duties and obligations of the state board of health shall be performed by the state health officer or at his direction, except as specifically otherwise provided in this act. Whenever under any provision of law any action is to be taken or approved upon order of the state board of health, such order shall be issued and signed by the state health officer under the authority hereby conferred. The state health officer shall administer and direct all of the affairs, work and activities of all of the administrative subdivisions of the state department of health.

Except as otherwise specifically provided by law and subject to the provisions of the Kansas civil service act and acts amendatory thereof and supplemental thereto, the state health officer is hereby authorized to appoint and prescribe the duties of such employees as may be necessary to carry out the powers, authorities, duties and obligations heretofore or hereafter imposed or conferred upon the state board of health and the state health department. Involuntary terminations of employment shall be ordered by the state health officer upon instruction of the state board of health. (L. 1963, ch. 397, sec. 3; June 30.).

74-901d. *Same; rule powers not delegated.* The power and authority to make and prescribe rules and regulations conferred by law on the state board of health shall not be delegated by such board to the state health officer or any other person or persons. (L. 1963, ch. 397, sec. 4; June 30.).

74-901e. *Same; hearings by board.* The power and authority to conduct hearings shall be in the state board of health; in cases in which hearings are to be conducted by hearing officers, such hearing officers shall be appointed by the state board of health; the power and authority to appoint hearing officers shall not be delegated by the state board of health to the state health officer or to any other person or persons. (L. 1963, ch. 397, sec. 5; June 30.).

74-901f. *Same; act supplemental.* This act (*) shall be supplemental to and a part of section 74-901 of the General Statutes Supplement of 1961. (L. 1963, ch. 397, sec. 6; June 30.).

74-901. *Rules and order of business; seal; meetings; compensation of members and secretary; expenses.* The state board of health shall make, adopt and publish such rules and order of business as may be necessary to make this act effective and facilitate the transaction of its business. It shall provide a seal, and all correspondence and papers emanating from it shall be under the seal of said board. It shall meet quarterly, and oftener if deemed necessary, at such place as it may designate, the first meeting to be held in the city of Topeka. The annual meeting after the first shall be held during the month of June in each and every year, at

Topeka; and a majority of its members shall constitute a quorum for the transaction of business.

The compensation for the members of said board shall be fifteen dollars ($15) for each and every day actually spent in the discharge of their duties, and the actual and necessary traveling expenses of said members shall while employed on the business of the board, be allowed and paid. The secretary shall receive such compensation as may be allowed by said board of health and approved by the governor, and to be paid him in the same manner as the salaries of other state officers are paid, and such necessary expenses shall be allowed him as the state auditor shall admit, on the presentation of an itemized account, having vouchers annexed, together with the certificate of the board. (L. 1885, ch. 129, sec. 2; L. 1903, ch. 357, sec. 2; R.S. 1923, 74-902; L. 1951, ch. 435, sec. 2; April 30.).

74-903. *Secretary; tenure of office; duties.* The secretary shall hold his office so long as he shall faithfully discharge the duties thereof; but may be removed for just cause at any regular meeting of the board, by a majority of all members of the board. He shall keep a record of all transactions of the board; shall have the custody of all books, papers, documents, and other property belonging to the office; shall communicate with other state boards of health, and with the local boards of health within this state; shall file and keep all reports received from such boards, and all correspondence of the office appertaining to the business of the board. He shall perform all other duties prescribed in this act for the said secretary or directed by the state board of health. (L. 1885, ch. 129, sec. 3; March 17; R.S. 1923, 74-903.).

The law wisely does not impose upon the board or department any kind of specific organizational pattern. Instead, complete latitude is given the board to adopt that form of organization considered at any given time to be in the best interests of the people of the state. Accordingly, the organizational structure has been modified administratively as the department has grown in size and complexity as a result of technologic advances, legislative mandates, changes in both funding patterns and personnel policies, and finally because of altered priorities.

The Organizational Chart

Because of constant changes in an organization of the size and complexity of the Kansas State Department of Health, the organizational chart must never be considered as inviolate. It should always be subject to change, for the better if possible.

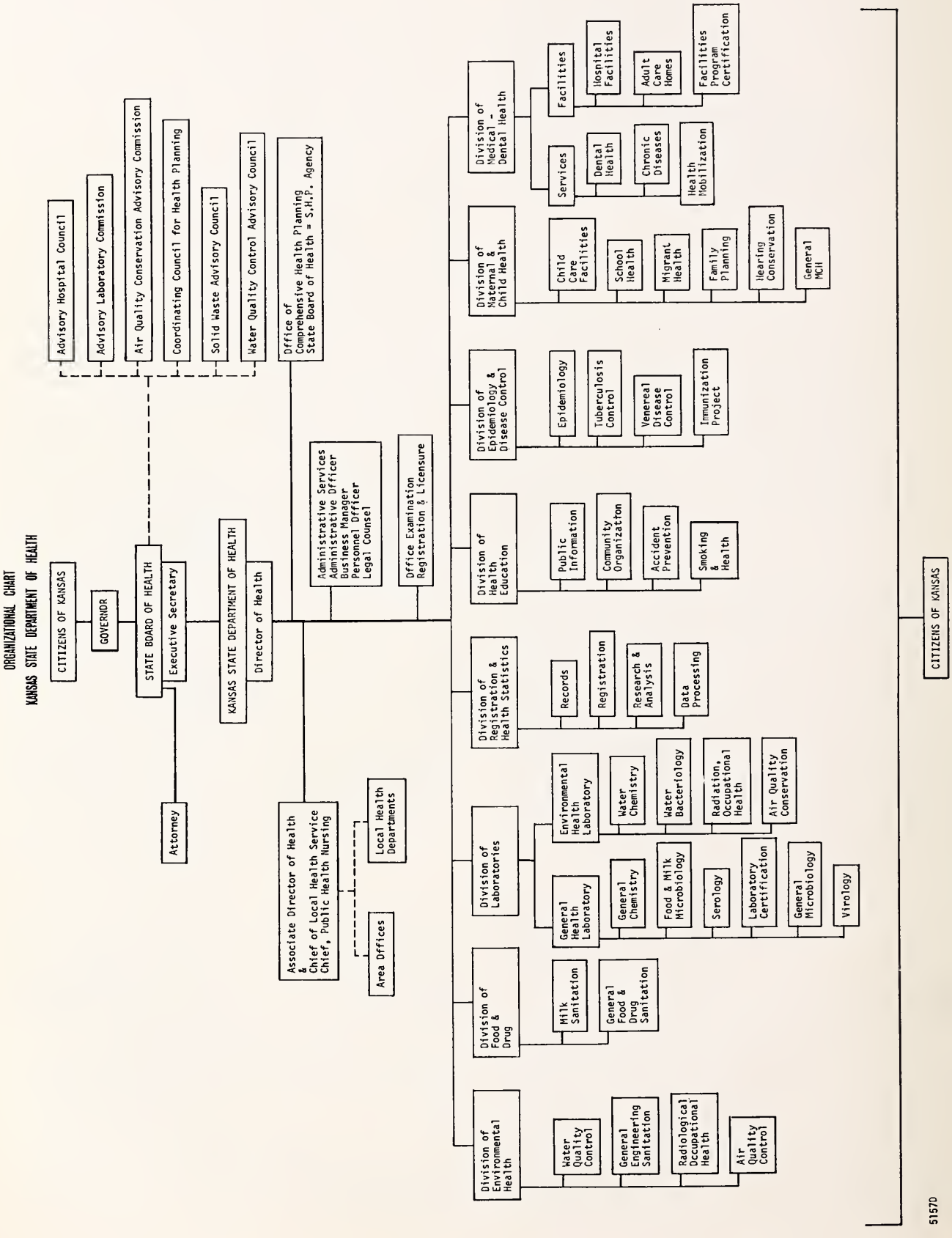
At any given time, the organizational chart reflects a bit of the past, much of the present, and some of the future. The past should be eliminated and the future made the present whenever and wherever possible.

In a way, the present organizational chart of the Kansas State Department of Health is unique in that, unlike most such charts, it portrays its origin—the people—and also the recipients of its services—the people of Kansas. Such portrayal indicates that the organization was created by the people to serve the people and, for that reason, should be concerned that its being have relevancy to all the people. This point cannot be stressed too much for its recognition should be a constant reminder of where one's loyalty in public service must ever reside. Health professionals especially are prone to let their loyalties abide with their professional associations rather than with the organization with which they are affiliated and pledged to uphold.

The Board of Health is a policy-setting board rather than an administrative or advisory board. Generally, in a professional organization, policy is fashioned at field levels and set by higher levels. Once set at the highest level, the lower levels of course are bound thereafter to comply until such time as the policy is reset.

A recent inventory prepared for the Association of State and Territorial Health Officers of health programs, for which the board and department are responsible, lists the following programs and services, altogether numbering approximately 50:

Office or Division	*Program or Service*
Administration	Central Administrative Services
	Fiscal Management
	Legal Services
	Personnel Services
Comprehensive Health Planning	Comprehensive Health Planning—State
	Comprehensive Health Planning—Areawide
Local Health Services	Local Health Services
	Public Health Nursing Services
	Home Health Care
Examination, Registration, Licensure	Licensure of Skilled Nursing Home Administrators
Environmental Health	Water Pollution Control
	Public Water Supply
	Noise Control
	Vector Control & Pesticides
	General & Recreational Sanitation
	Radiation Control
	Air Quality Control
	Occupational Health
Food and Drug	Food & Drug & Hazardous Household Articles
	Milk Sanitation & Surveillance
	Meat & Poultry Inspection
Laboratories	Laboratory Diagnostic & Surveillance Services
	Laboratory Certification & Improvement Services
Registration & Health Statistics	Vital Records Registration
	Health Statistics
	Data Processing


ORGANIZATIONAL CHART
KANSAS STATE DEPARTMENT OF HEALTH
CITIZENS OF KANSAS
GOVERNOR
STATE BOARD OF HEALTH
Executive Secretary
Attorney
Advisory Hospital Council
Advisory Laboratory Commission
Air Quality Conservation Advisory Commission
Coordinating Council for Health Planning
Solid Waste Advisory Council
Water Quality Control Advisory Council
KANSAS STATE DEPARTMENT OF HEALTH
Director of Health
Office of Comprehensive Health Planning State Board of Health = S.H.P. Agency
Administrative Services
Administrative Officer
Business Manager
Personnel Officer
Legal Counsel
Office Examination Registration & Licensure
Associate Director of Health & Chief of Local Health Service Chief, Public Health Nursing
Area Offices
Local Health Departments
Division of Environmental Health
Water Quality Control
General Engineering Sanitation
Radiological Occupational Health
Air Quality Control
Division of Food & Drug
Milk Sanitation
General Food & Drug Sanitation
Division of Laboratories
General Health Laboratory
General Chemistry
Food & Milk Microbiology
Serology
Environmental Health Laboratory
Water Chemistry
Water Bacteriology
Radiation, Occupational Health
Laboratory Certification
Air Quality Conservation
General Microbiology
Virology
Division of Registration & Health Statistics
Records
Registration
Research & Analysis
Data Processing
Division of Health Education
Public Information
Community Organization
Accident Prevention
Smoking & Health
Division of Epidemiology & Disease Control
Epidemiology
Tuberculosis Control
Venereal Disease Control
Immunization Project
Division of Maternal & Child Health
Child Care Facilities
School Health
Migrant Health
Family Planning
Hearing Conservation
General MCH
Division of Medical - Dental Health
Services
Facilities
Dental Health
Chronic Diseases
Health Mobilization
Hospital Facilities
Adult Care Homes
Facilities Program Certification
CITIZENS OF KANSAS
51570

Office or Division	*Program or Service*
Health Education	Health Education
	Emergency Medical Services
Epidemiology & Disease Control	Epidemiology
	Encephalitis Control
	Tuberculosis Control
	Venereal Disease Control
	Immunization
	Rubella
Maternal & Child Health	School Health Program
	Child Care Facilities Licensure
	Family Planning
	Hearing Conservation
	Migrant Health
	Infant & Preschool
	Special MCH Services:
	Fibrocystic Disease
	PKU
	Handicapped children & pregnant women
Medical-Dental Health	Hospital Construction
	Adult Care Home Licensing
	Medical Facilities Certification
	Screening & Consultation
	Dental Health
	Fluoridation
	Renal Disease
	Health Mobilization
	Hospital Licensing

The Board of Health, representative of various health professions, assures that programs are kept relevant. To provide even greater assurance, the legislature has seen fit to establish six advisory councils or committees to the State Board of Health. These committees, through their membership, not only expand the professional representation in diversity but also the civic representation. Federal legislation has given strong impetus to involvement of the non-health professional or consumer in having a voice in the shaping of the health service product. Comprehensive health planning councils at both state and local or regional levels by law must have at least 51 per cent of the membership composed of consumers. The emphasis upon comprehensive health planning and comparable councils is an effort to free state and local health departments of professional domination. Another way in which such professional domination is being eliminated is through establishment of departments of human resources, or departments of health and social welfare or super agencies. Under such arrangements, the health function is retained but under political and consumer, rather than professional, direction. To retain some reasonable degree of direction, professional groups might do well to seek consumer participation. The alternative can easily be the complete loss of valuable and irreplaceable professional direction.

The organizational chart also is unique in that it shows the flow of service from the people to the governor, to the board, to the health officer and division directors to field staff, and finally to the citizens of Kansas. Such flow indicates the vital role that administration plays, namely service to staff to enhance its capacity to serve people.

Too often administration, and even staff, have the misconception that staff serves them and not vice versa. Enlightened administrators understand their role as one of developing and strengthening staff capacity, competency, and conscience. Administrators are too few to make any significant contribution by way of direct service. For this reason, they must work to attain their goals through the understanding and support they can develop in others.

Staff

Outside of the university, the Kansas State Department of Health has a greater variety of professional persons on its staff than any other state or local governmental or health agency in Kansas. These include physicians, dentists, veterinarians, architects, nurses, educators, microbiologists, chemists, attorneys, geologists, engineers, social workers, statisticians, sanitarians, and others. In organizations with such arrays of talent to handle its many diverse responsibilities, administration becomes more supportive than directive or supervisory. In organizations with limited responsibility and staff of limited talents, administration is more supervisory and less supportive and the administrator is, therefore, limited in the number of persons he can supervise. The administrator of a professional group is not bound by such restrictions. Support can be given to a great number of persons bound by competence and conscience. The more confidence administration places upon such an individual, the more will be that person's output. The observant and skilled administrator will know in whom and to what degree confidence and trust can be placed.

Staff of the Kansas State Department of Health totals approximately 412.25, of which 346.25 are based in the main and area office in Topeka, and 66 in the five area offices of Dodge City, Wichita, Chanute, Salina, and Hays.

The area offices were established in 1954 partly in the belief that this would bring community health services closer to the people who, upon seeing their benefit, would be encouraged to establish their own local health services. As this has happened, area staff is finding it possible to direct more effort to consulting with and assisting local officials in performance of their duties and less time in provision of direct services to individuals. The staff recognizes the difficulties in attempting to provide health services at the local level from a central administrative point hundreds of miles removed.

The staff, by office and division, is as follows:

Administration	14.60
Comprehensive Health Planning	7.00
Local Health Services	20.05
Examination, Registration, and Licensure	2.00
Environmental Health Services	100.05
Food and Drug	12.65
Laboratory	66.00
Registration & Health Statistics	47.70
Health Education	12.00
Epidemiology & Disease Prevention	40.50
Maternal & Child Health	56.20
Medical-Dental Health	33.50
Total	412.25

Membership of the Board of Health and the Advisory Committees numbers as follows:

Board of Health	11	
Advisory Hospital Council	12	
Advisory Laboratory Commission	5	
Air Quality Conservation Advisory Commission	8	
Coordinating Council for Health Planning	15	(+6 advisors)
Solid Waste Advisory Council	15	
Water Quality Control Advisory Council	11	(+2 ex-officio members)
Total	77	

Certain of the advisory councils involve participation of other individuals on their standing committees, thus greatly increasing the input by citizens throughout the state in determining the community health program. The bulk of community health workers are employed at the local level of government. These number approximately 750. One of the most important functions of administration of the State Health Department is to assist the efforts of these officials in the creditable discharge of their responsibilities to the people of their area.

Budget

The following budget summary of the Kansas State Department of Health provides a measure of its size and operation. It is important to note that of the $10,455,418 total, $6,639,126 (63.5%) is federal and $3,816,292 (36.5%) is state money. Furthermore, of the total, $4,470,498 is allocated to counties to assist their officials in meeting their problems locally. An additional $550,000 is expended in direct services provided citizens at the local level by staff members of the Kansas State Department of Health. The budget is a subject which can find adequate treatment only through a separate paper, and will so be handled.

Conclusion

In some way, every day the Kansas State Department of Health affects the lives of all the citizens of the state directly and indirectly. This awesome fact imposes a heavy responsibility upon the board, its advisory committees, and staff individually and collectively. In attempting to fulfill their duties, these officials will win no popularity contest, but this is not expected. Public officials cannot be, nor do the people want them to be, all things to all people at all times. Any attempt to be that, will result in falling short of the stewardship placed on such officials.

The Opportunity

(Continued from page 530)

in his district—and the opinions of the medical establishment as promulgated by its collective decisions. Paradoxically, the physician-representative, having opinions derived from personal knowledge and experience as well as personal philosophy, is less likely to be influenced by an official statement of position, unless he has been an active participant in the process of its development.

Admitting that total agreement on every phase of medical legislation—two parties generally represent two opinions and each additional one increases the ideas geometrically—is an impossibility, the effective translation of medical proposals into satisfactory legislative facts should by no means be an impossibility. Differences do not call for aggravation of the schism, but greater effort toward their resolution. The tired but nonetheless pertinent term, communication, takes on greater significance as the legislative effort crystallizes. Communication involves three essentials: availability of the communicants, a common language free from ambiguity and equivocation, and sufficient philosophical rapport to permit a rational derivation of a solution. It would be more than unfortunate if the opportunity for maintaining this communication should be lost at a time when the parties have these essentials available as never before and not likely again. It is a time for medical politics to become medical statesmanship.—*D.E.G.*

Letters to VOX DOX should be addressed to the Vox Dox Editor, Journal of the Kansas Medical Society, 1300 Topeka Avenue, Topeka, Kansas 66612.

Obituaries

HORACE LEE GALLOWAY, M.D.

Dr. Horace Lee Galloway, of Anthony, died September 8, 1972 at the age of 87. He was born June 19, 1885, in Harper.

Dr. Galloway was graduated from the Drake University School of Medicine, Des Moines, in 1910. He had practiced in Anthony since 1911.

Surviving Dr. Galloway are his wife, a daughter, and a son.

HERBERT W. GOOTEE, M.D.

Dr. Herbert W. Gootee, 85, of Topeka, died October 18, 1972. He was born November 14, 1886, in Loogootee, Indiana.

Dr. Gootee was graduated from the St. Louis School of Medicine in 1915.

Surviving Dr. Gootee are his wife, a daughter, and a son. A memorial fund has been established with the American Heart Association.

S. PAUL HORNUNG, M.D.

Dr. S. Paul Hornung, 53, of Colby, died October 14, 1972. He was born January 20, 1919, in Spearville.

Dr. Hornung was graduated from the University of Kansas School of Medicine in 1949.

Survivors include his wife and four sons.

JOSEPH J. HOVORKA, M.D.

Dr. Joseph J. Hovorka, 73, of Emporia, died October 30, 1972. He was born July 1, 1899, at Wagner, South Dakota.

Dr. Hovorka was graduated from the Creighton University School of Medicine in 1924.

Surviving Dr. Hovorka are his wife, two daughters, and two sons.

CHESTER L. YOUNG, M.D.

Dr. Chester L. Young, 64, of Kansas City, died October 21, 1972. He was born February 11, 1908, in Kansas City, Missouri.

Dr. Young was graduated from the University of Kansas School of Medicine in 1934.

Survivors include his wife, a daughter, and two sons. A memorial fund has been established at Bethany Hospital.

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